Perspective™

by PPM

Workflow

USER'S GUIDE

Perspective by PPM™

Version 2.0

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Contents

Welcome to Perspective Workflow

Welcome to Perspective Workflow™, a component of Perspective by PPM 2000™—the industry leader in Incident Reporting and Investigation Management software. Perspective not only records and tracks incident data, but assesses and analyzes it to chart trends and report statistics. And with Workflow, Perspective also has custom alerts and business process automation.

Perspective Workflow is a business activity monitoring application that works behind the scenes to help you stay on top of Perspective's reported incidents, ongoing investigations, and current assignments. It monitors and auto-responds to critical, time-sensitive data, automatically notifying the necessary personnel, and guiding team members through the proper processes and protocols. It's about getting the right information, to the right people, at the right time.

Administration

Perspective Workflow Administration

The Perspective Workflow Administrator module allows you to perform seven functions:

- View the status of Perspective Workflow's servers.

- View the names of users logged into Perspective Workflow.

- View (and correct) any errors that were encountered by Perspective Workflow.

- Configure hardware settings for faxing and paging.

- Configure software settings for email, faxing, paging and holidays.

- Specify user authorizations for access to Perspective Workflow.

- Maintain and optimize the Perspective Workflow database.

The Administrator: Logging In

Log into the Perspective Workflow Administrator ("Admin"; no password); you will see "Administration Folders" as follows.
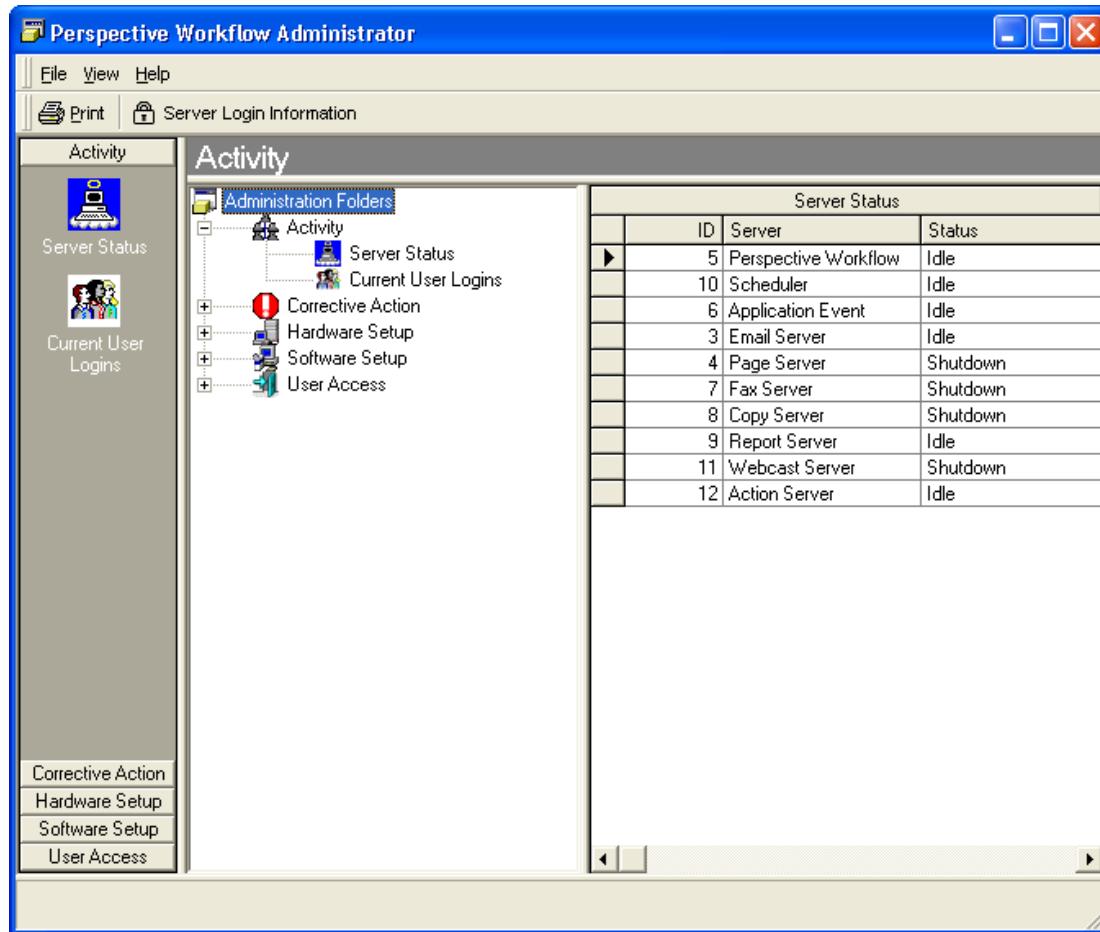
How to Navigate

To <u>select a folder</u>, double-click the folder you wish to work in, or single-click its corresponding button in the bottom left corner of the window.

To <u>select a specific option</u>, select a folder first, and then single-click the item you wish to select. (E.g., Select the "Hardware Setup" folder, and then the "Fax Serial Ports" option.) Note that once you select a specific option, the right pane changes to display the records associated with that option.

To <u>add a new record</u> under a specific option (e.g., to add a new fax port), click on the "New" button in the top-left corner of the window. You may also select "New" under the Perspective Workflow Administrator File menu and select the object you wish to add.

To <u>view or update an existing record</u> under a specific option (e.g., to review the set-up of an existing fax port), double-click the record in the right pane.

To <u>delete a record</u>, single-click the record in the right pane and click the "Delete" button that appears under the Perspective Workflow Administrator menu bar. (You may also delete a record after having selected it for viewing or updating.)

Activity Folder

The Perspective Workflow Activity folder tells you about the current processing and user activity occurring within the application.

Server Status

This displays the current status of the servers used by Perspective Workflow. The possible status states are as follows:

- <u>Shutdown</u>: The server is not running. Possible reasons are:

  - The service is shutdown.

  - The server is set <u>not to run</u>. (Double-click on the server and review the "active" status of the server.)

    (If you know that your site will not be using certain functions (e.g., faxing), you can disable the corresponding server to conserve resources.)

    Perspective Workflow is shipped with all servers enabled except for the Paging, Faxing, Reporting, Copying, Webcasting and Action servers.

- <u>Idle</u>: The server is running but is not processing any data.

- <u>Processing</u>: The server is processing data.

- <u>Linking</u>: (For the application event server only.) Perspective Workflow is retrieving alert recipient (subscriber) data from an external database.

- <u>Startup</u>: The server is starting up.
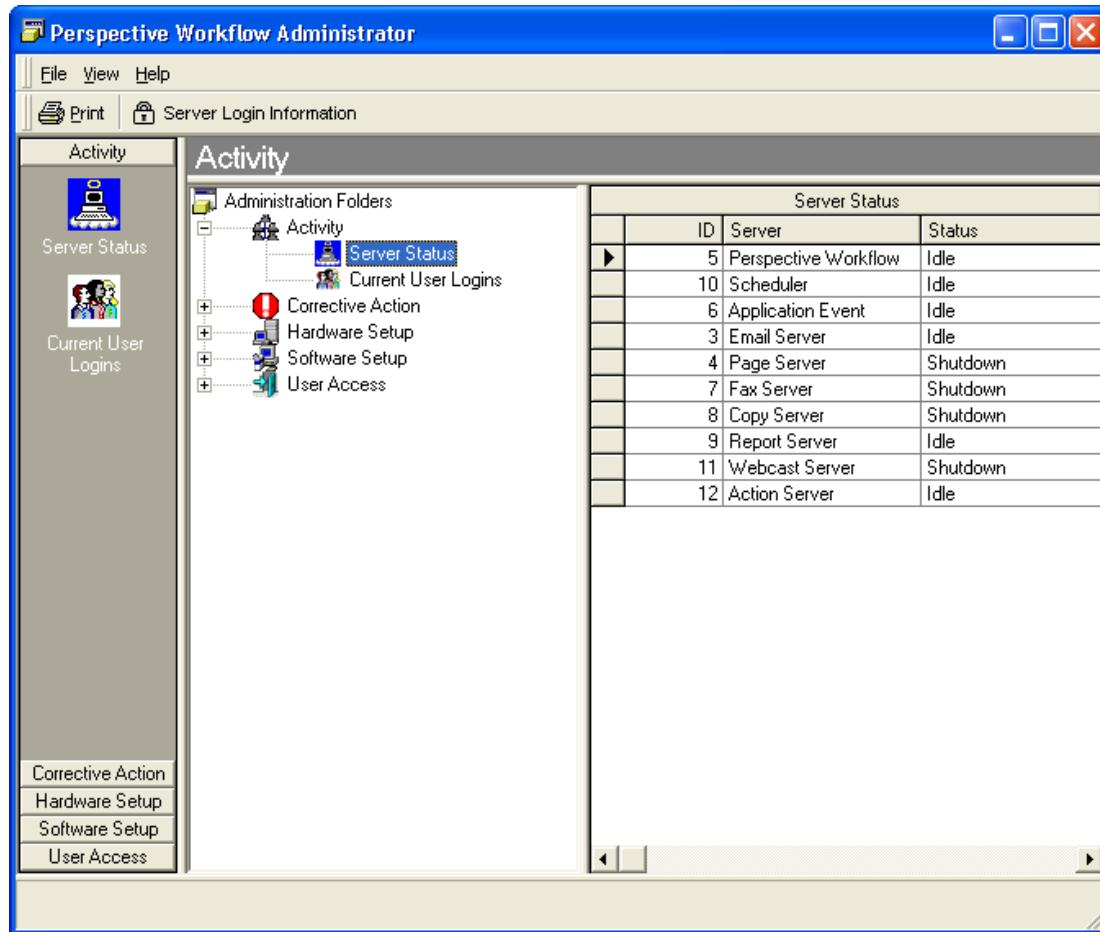
Server Descriptions

- Perspective Workflow Server: This server initiates all of the other servers. Note that this is a *Windows® Service.*

- Scheduler Server: This server schedules events for execution.

- Application Event Server: This server executes application events.

- Report Server: This server generates Crystal Reports®.

- Email Server: This server delivers email messages.

- Fax Server: This server delivers fax messages.

- Page Server: This server delivers pager messages.

- Webcast Server: This server delivers Webcast (dashboard alert) messages.

- Copy Server: This server copies and ftp's files and reports.

- Action Server: This server executes event workflow.

Server Notes

- If any of the first three servers are shutdown or paused, Perspective Workflow will not be able to check for events, send notifications or execute workflow.

- If any of the notification servers (email, fax, page, Webcast or copy) are shutdown or paused, Perspective Workflow will not be able to send alerts via the corresponding methods.

- When data is being processed, the server will show a status of "processing." When there is no data to be processed, the server will show a status of "idle."

- Under the "Unlimited Connection" license only, the Application Event server is multi-threaded.

Enabling / Disabling a Server

You may either enable a server to run, or disable a server from running. To enable a server, select the server record from the Server Status window and place a check in the field titled "Allow Server to Process." To disable a server, select the server record from the Server Status window and ensure that there is no checkmark in the field titled "Allow Server to Process."

Starting / Stopping Servers

To start a server that is shutdown, first put a checkmark in the corresponding server's "Allow Server to Process" field. If the Service is running, stop the Service and restart it. If the Service is not running, start it.

To stop a server that is running, remove the checkmark in the server's "Allow Server to Process" field.

To start a server that is paused, place a checkmark in the corresponding server's "Allow Server to Process" field and stop and restart the Service.

To stop all Perspective Workflow servers, stop the Windows Service.

Perspective Workflow Server Login Information

By default, all servers log into Perspective Workflow using user "Admin" with a blank password. However, if you change or delete this default setting for "Admin", you must tell Perspective Workflow what username and password to use for its servers.

To access the username and password for the Perspective Workflow servers, follow these steps:

1.   Highlight (single-click on) the "Server Status" branch.

2.   Click on the "Server Login Information" button at the top of the Administrator window.

3.   Fill in the username and password for the Perspective Workflow servers.

4.   Click OK.

Modify this setting only if you have changed the login properties for user "Admin". Note that you must re-specify the Perspective Workflow server login information whenever the application is upgraded. (This information is stored in the local system's registry.)

Current User Logins

The Current User Logins option tells you the following about each user logged into the Perspective Workflow application:

•   The module they are logged into—either the "Administrator", "Event Monitor", "Navigator", or "Event Manager."

•   The user's computer and user names.

•   The user's operating system and platform.

•   The date and time that the user last logged into the application.

•   The date and time of the user's last activity.

Corrective Actions

When Perspective Workflow executes a function (such as checking an event or sending an alert), it is possible that an error may occur. If so, Perspective Workflow tracks what the error was and allows you to take a "corrective action" to address the error.

"Pending" tasks (such as pending events) will also appear within Corrective Actions and you may use this option to remove or "complete" those tasks.

Perspective Workflow lets you take corrective actions in response to:

- Application event errors (errors when checking for triggered events).

- Email delivery errors.

- Fax delivery errors.

- File copy (ftp) delivery errors.

- Pager delivery errors.

- Web Dashboard (Webcast) delivery errors.

- Report generation errors.

- Workflow action errors.

When an error occurs, Perspective Workflow places the record in an "error" state as well as in a "pending" state. The error will be listed within the corresponding "Errors" sub-branch under the "Corrective Actions" branch.

For every error record you will be shown:

- Error: The internal application error number.

- Error Message: The error message text.

- Application: The name of the application to which the record belongs.

- Description: The description of the event that errored.

Perspective Workflow will re-submit any error record every minute until the record is: 1) successfully processed, 2) manually deleted, or 3) marked as "complete".

Application Event Errors

Application event errors are usually caused by an event that has a configuration error, such as an invalid query, but can also be caused by system problems, such as no access to a database on a server that is currently down.

Application event errors that are due to a configuration error may be addressed by correcting the associated error (such as re-configuring the related query). Once this error has been fixed, the erroring event will execute successfully the next time Perspective Workflow re-submits the erroring record.

Message Delivery Errors

"Delivery" errors often result from one of three causes:

- Improper configuration to send out the corresponding alert (e.g., the email sending account is improperly configured).

- System problem (e.g., your email server is down).

- An invalid recipient's address (e.g., an invalid pager PIN number).

Perspective Workflow will attempt to re-send the erroring record every minute until it is successfully delivered, manually deleted or marked as complete.

Unlike application event errors, delivery errors allow you to correct the delivery address. For example, if a pager alert has an invalid PIN, you can use a corrective action to modify the recipient's delivery address.

Report Generation Errors

Report generation errors are most often caused by an invalid report design, or by a system problem (such as a report server being unavailable).

If you correct the problem that is causing the error (such as correcting the report design), Perspective Workflow will successfully execute the report the next time it runs.

If you have an event that generates a report, all notifications (e.g., email, faxes, etc.) are on the successful generation of that report. If the report is unsuccessful, the resulting notifications will not appear as "pending" or "errors" because the report itself never completed.

Response Action Errors

Action errors occur when an event submits a workflow action (such as a Microsoft® Visual Basic® script or SQL statement) and that action encounters an error.

Action errors are re-submitted every minute until successfully completed, manually deleted or marked as complete. Like application events, you can correct an action and the action will execute successfully the next time Perspective Workflow runs it.

Taking a Corrective Action

The first step is to click on the corresponding corrective action option (such as Email Delivery Errors") and check to see if there are any current error records.

If an error does exist, select the record. A new window containing the error record's details will open.

You have three options from this window:

- Complete the record manually. Marking the record as "complete" retains it in Perspective Workflow's history as successfully (manually) completed.

- Delete the record. Clicking on the "Delete" button removes it from the database.

- Correct the record. Not all records may be corrected; this depends on the type of error that occurred.

Note that email messages sent to "undeliverable" addresses are not flagged as errors. (Perspective Workflow's Email Response System can identify undeliverable messages.)

Hardware Setup

There are two components to configuring hardware:

- Defining fax ports.

- Defining pager ports.

If you will be sending out alerts via modem-driven fax or pager, you must take these options; if not, you may skip this option.

Note that many faxing and paging utilities allow messages to be sent to a fax or pager number through email (i.e., you send a message to an email address which is the pager's phone number). If you will be using this method, you do not need to configure modem ports.

Configuring Perspective Workflow for Faxing

Perspective Workflow supports any class 1 or class 2 modems installed on (or reachable from) the Perspective Workflow server.

Perspective Workflow offers two faxing interfaces: an embedded faxing technology and Microsoft Fax.

To send out messages via a modem-driven fax, Perspective Workflow requires the use of a modem reachable from the Perspective Workflow server. This modem may be shared by other applications and devices.

To configure Perspective Workflow for non-Microsoft Fax usage, follow these steps:

1. Click on the "Fax Serial Ports" branch within the "Hardware Setup" branch.

2. Up at the top-left corner of the Administrator window, click the "New Fax Communication Port" button. The following window will appear:
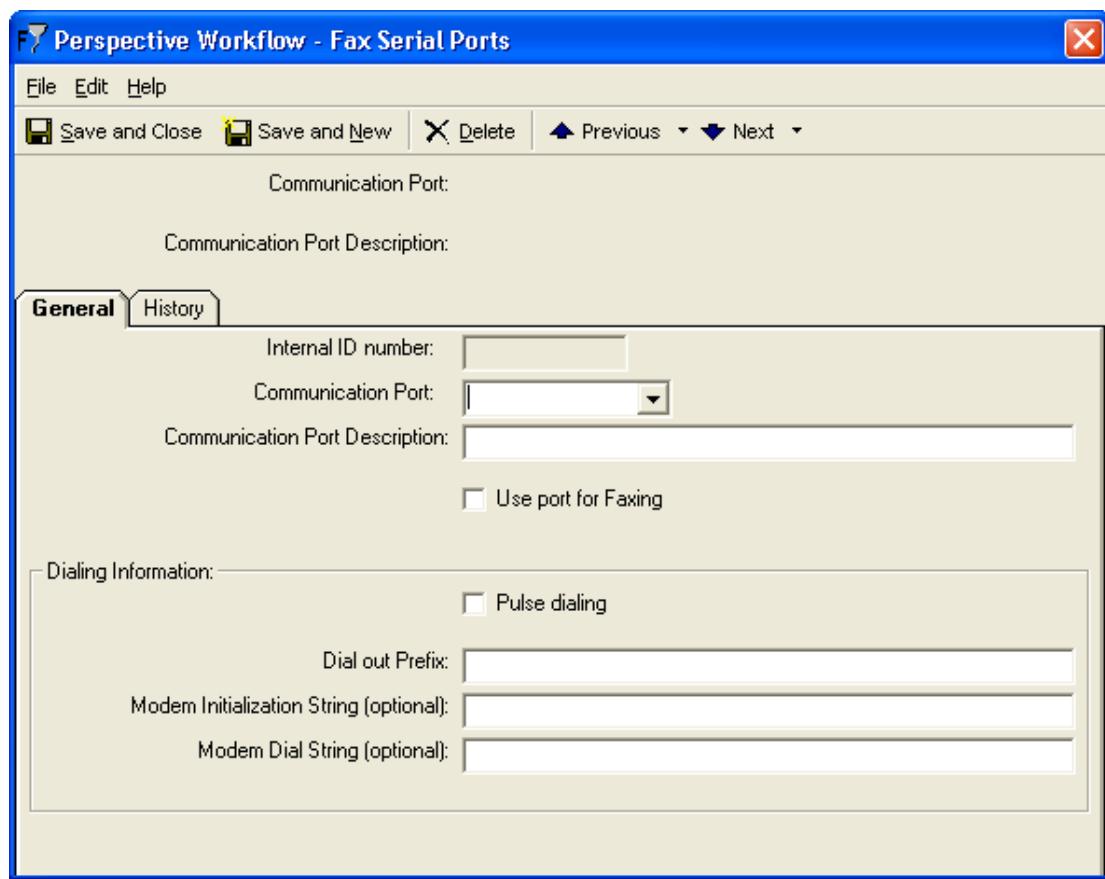
3. Complete the following fields:

    - Communication Port Number: The port to use for sending faxes.

    - Communication Port Description: Description of this port.

    - Use Port for Faxing: Whether this port is available for faxing. (You can configure a COM port for availability without enabling it for immediate use.)

- <u>Pulse Dialing</u>: Whether you use pulse dialing.

- <u>Dial Out Prefix</u>: The prefix (if any) to reach an outside line (e.g., "9").

- <u>Modem Initialization String</u>: The command to initialize the modem.

- <u>Modem Dial String</u>: The command to precede your dial-out number.

If you configure multiple fax ports, Perspective Workflow will automatically scan the list of ports for the first available modem when a fax message needs to be sent.

Configuring Perspective Workflow for Paging

Perspective Workflow supports any class 1 or class 2 modems installed on (or reachable from) the Perspective Workflow server. Perspective Workflow also supports SMS (short message syntax) paging.

To send out messages via modem-driven pager, Perspective Workflow uses a modem reachable from the Perspective Workflow server. This modem may be shared by other applications and devices.

To configure Perspective Workflow for paging, follow these steps:

1. Click on "Pager Serial Ports" within the "Hardware Setup" branch.

2. Click on the button called "New Page Communication Port."
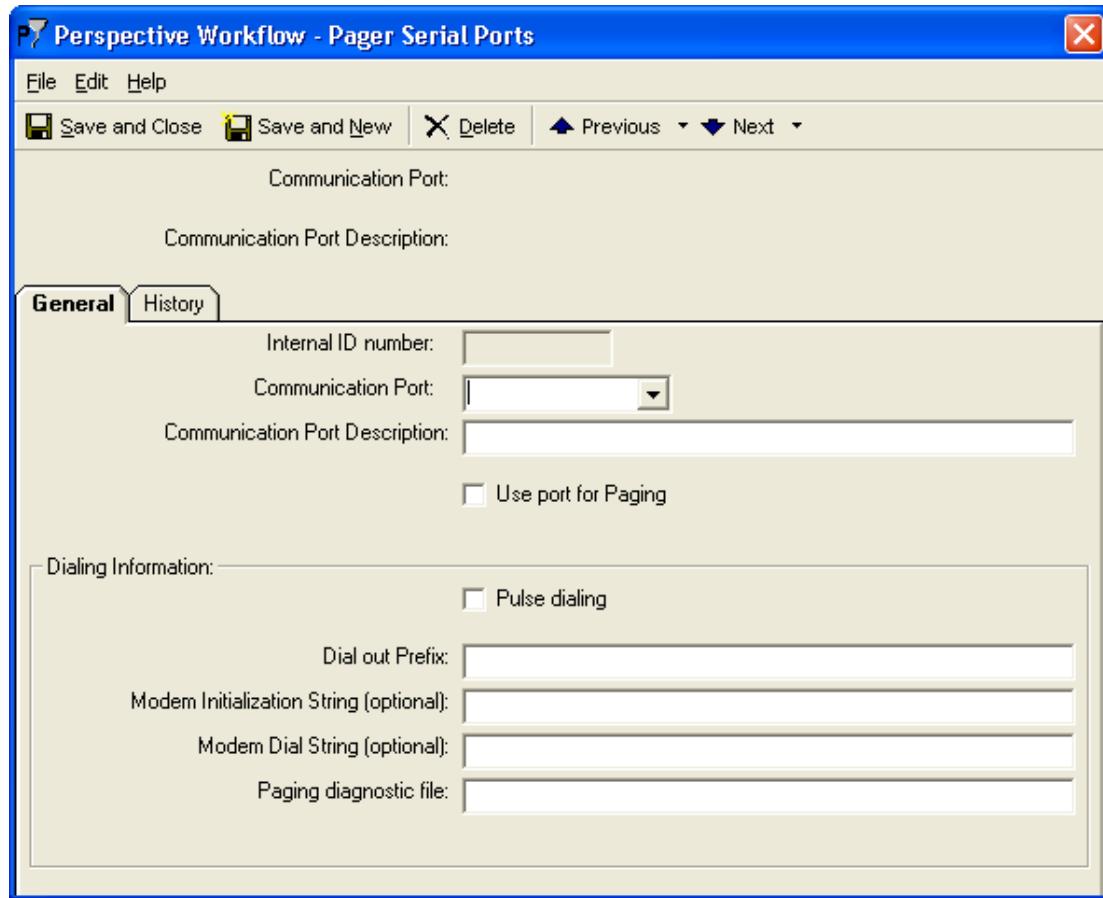
3.   Complete the following fields:

- COM Port Number: The port to use for sending pages.

- COM Port Description: Description of this port.

- Use Port for Paging: Whether this port is available for paging. (You can configure a COM port for availability without enabling it for immediate use.)

- Pulse Dialing: Whether you use pulse dialing.

- Dial Out Prefix: The prefix you use to reach an outside line (e.g., "9").

- Modem Initialization String: The command to initialize this modem.

- Modem Dial String: The command to precede your dial-out number.

- Paging Diagnostic File: Leave blank. This file stores historic and diagnostic data from page messages that are sent.

If you configure multiple pager ports, Perspective Workflow will automatically scan the list of ports for the first available modem when a pager message needs to be sent.

Software Setup

These options include the configuration of the following:

- Email Sending Account

- Email Response System[*]

- Fax Sending Account

- Fax Cover Page Design

- Holiday Calendar

- Paging Services

- Webcast (Dashboard Alerts) Template Locations[*]

Email Sending Account

Within the "Software Setup" folder is the option to configure "Email Accounts."

1. Click on "Email Accounts" within the "Software Setup" branch.

2. Click the "New Email Account" button. (To modify an existing email account, double-click on the account on the right.)

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[*] Configuration of the Email Response System (ERS) is located within the option for "Email Account" set-up. ERS configuration and use are detailed in the "Email Response System" section of the "Advanced Functionality" chapter later in this guide.

[*] Configuration of the Webcast (Dashboard Alerts) component is detailed in the "Dashboard Alerts (Webcasting)" section of the "Advanced Functionality" chapter later in this guide.
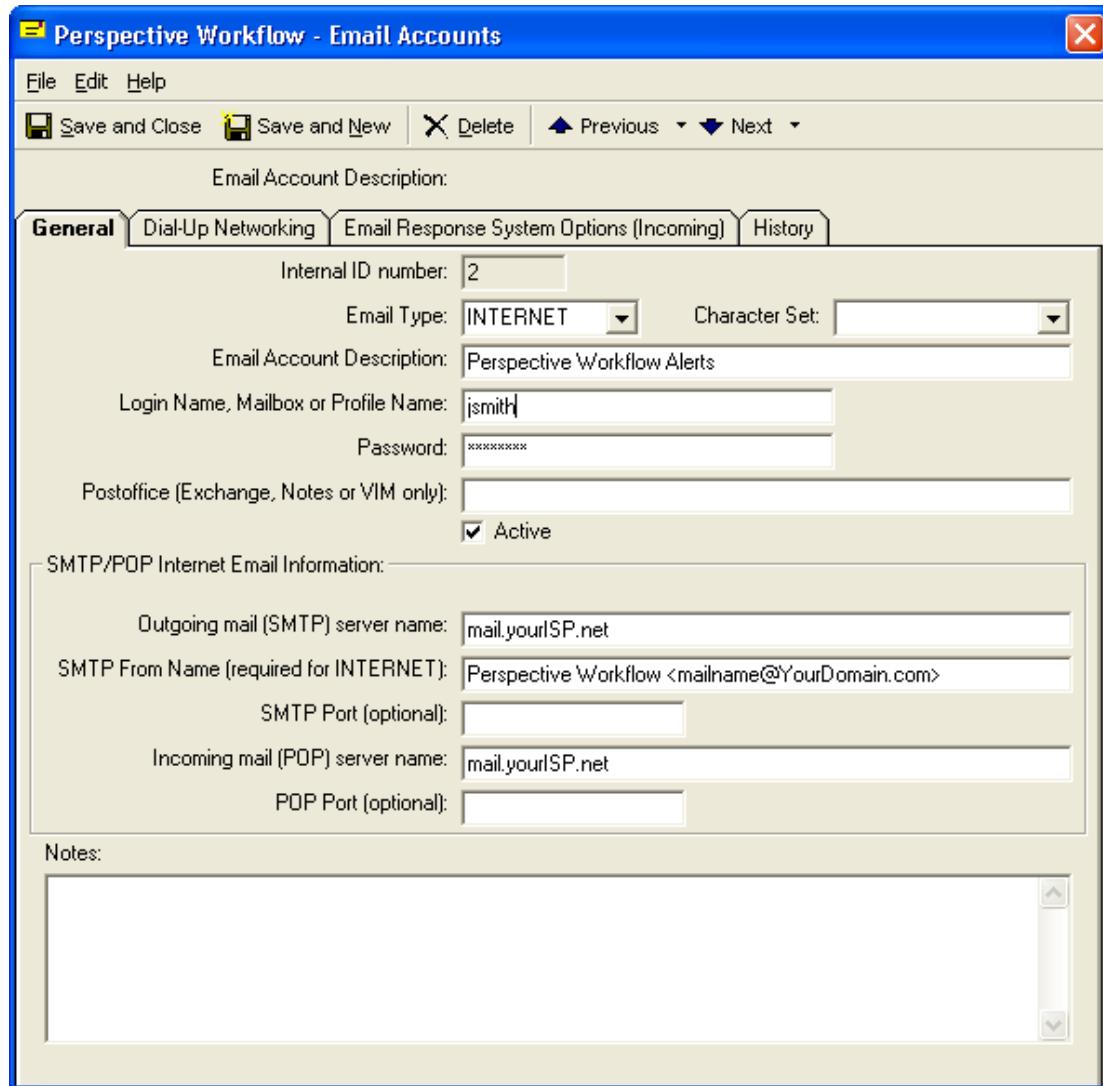
3.   Fill in the fields as follows:

- Email Type: Select from "Exchange", "Mapi", "Vim", "Internet", or "Unknown". (Note that HTML-formatted email is supported only with type Internet. Mapi should be used only for stand-alone alerts.)

- Email Account Description: E.g., "Perspective Workflow Alerts".

- Login Name: The login user name for this account. (Use the profile name for Mapi, and use the mailbox alias name for Exchange.)

- Password

- Postoffice: For use with Exchange, Lotus Notes email and Vim-compliant email systems. (For Notes and Vim, fill this in only if the postoffice you will be using is different from the default postoffice you defined when you set up the Notes or Vim client. For Exchange, this value is the exchange server name.)

- Active: Whether this account is currently available for sending email.

- Outgoing Mail SMTP Server Name: For Internet email systems (SMTP). The name of the server that will be used when sending email notifications.

- SMTP From Name: Required for Internet email systems. The name that will appear as the "sender" of the email message. This must be a valid email address with a valid domain name, such as *Technical Support Department <support@ppm2000.com>.*

- SMTP Port: The port that will be used to accommodate firewall security software. Leave this field blank unless otherwise instructed by PPM 2000.

- Incoming Mail POP Server Name: If incoming email is to be monitored, key in the name of the incoming email server.

- POP Port: The port that will be used to accommodate firewall security software. Leave this field blank unless otherwise instructed by PPM 2000.

GroupWise Integration

Perspective Workflow supports connectivity with GroupWise via SMTP. When configuring the "Email Account" record, specify the email type, "INTERNET". You must have both SMTP and POP3 enabled in GroupWise.

Microsoft Exchange (Requirements)

You will gain ease-of-use and functionality if Exchange is configured for SMTP (see "Exchange Under SMTP" in a later section.)

Microsoft CDO (Collaboration Data Objects) must be installed to use native Exchange email; install it if it's not already there. You can check this by:

1. Going to your Control Panel.

2. Select "Add/Remove Programs".

3. Look for Microsoft Office or Microsoft Outlook®.

4.   Click on "Add or Remove Features".

5.   Expand the branch for Microsoft Outlook.

6.   Look for a branch called "Collaboration Data Objects".

Verify that the Perspective Workflow Service is running under an account that has authenticated access to your Exchange mailbox (i.e., is a domain controller authenticated user).

By default, the Perspective Workflow service is installed to run under the Local System account. This is <u>not</u> a valid account and will <u>not</u> work with Exchange. Go into Services and ensure that an authenticated username and password have been selected.

Make sure that no other user is logged into Microsoft Outlook on the Perspective Workflow server. (You will receive a "login failure" message if this condition exists when Perspective Workflow goes to send email.)

Microsoft Exchange (Native)

Please log in under the user account that the Perspective Workflow service will run under.

To configure this email account, follow these steps:

1.   Stop the Perspective Workflow service.

2.   Select email type "Exchange".

3.   Key in the email account name/description.

4.   Create (or determine) the account that will send out the email alerts.

5.   Go into Exchange Administration, and (using the "Primary Account" option) make sure that the primary account for this mailbox is configured to use the same account that the Perspective Workflow Service runs from.

6.   Set the Mailbox login name to the mailbox alias or directory name. (Sometimes the mailbox might be 'Bob Jones' but the real name is 'bjones'. The real name will never have spaces in it.)

7.   Specify the password (the logon user password) to access the mailbox.

8.   In the Postoffice field, place your Exchange server name.

9. Restart the Perspective Workflow Service.

Microsoft Exchange (Under SMTP)

If you are running Exchange under SMTP, follow these steps:

1. Stop the Perspective Workflow service.

2. Select email type "Internet".

3. Key in the email account name/description.

4. Specify the login name and password.

5. Leave the Postoffice field blank.

6. Adjust the default server names to your site (such as server.[your_company].com).

7. Adjust the SMTP From Name to be a valid email account.

8. Restart the Perspective Workflow service.

Lotus Notes Mail

Perspective Workflow supports Lotus Notes Mail only if POP is <u>not</u> enabled.

Here are the steps to configure Perspective Workflow to send email via Lotus Notes:

1. Install the Lotus Notes client components on the Perspective Workflow server. (Decide which account will be used by Perspective Workflow and install the Lotus Notes client components for that user.)

2. Log on to Lotus Notes (for the specified user) and send a test email.

3. Configure the Perspective Workflow Service to run under the same user as the Lotus Notes email user specified in the previous steps.

4. In the "Email Accounts" option, set the email type to "VIM".

5. Leave the Post office field blank. This field is used only if you want to connect to a post office other than the default one.

6.   Specify the Username/mailbox. Do not use the "short name"; use the full specification. Using just a name value (such as "Robert Williams") will not work. A typical Lotus Notes username looks like this: *Robert Williams/Faculty/Atlanta* OR *Robert Williams/Faculty*.

7.   Make sure that the installed Lotus Notes folder is included in the "PATH" variable (usually C:\Lotus or c:\Notes).

If the logon to Notes fails with a bad username or bad password, Notes will typically pop up an error message and prompt for the correct username and password.

It is suggested that you initially run the Perspective Workflow "Desktop Service" to confirm whether your Notes mail settings are correct. With the Desktop Service, any error messages will appear on the desktop of the user who started the service.

If you are unsure of the username of the Notes user mailbox, scan your system for the file called "Lotus.ini" and review the contents of the file. You should see information within it naming the Lotus Notes user account.

Email Authentication

Email authentication is enabled for Internet-based email systems only.

To configure an email account for authentication and secure sockets (such as with gmail), set the Email Account Description to whatever you like (e.g., "Company Alerts") followed by "/AUTH/LOGIN/SSL" as in: *Company Alerts/AUTH/LOGIN/SSL*. Set the Login Name to your email address. Set your outgoing SMTP server name accordingly (e.g., smtp.gmail.com), and choose Port 465.

To configure an IIS email account for authentication and secure sockets, follow the email account description with "/AUTH/NTLM/SSL" as in: *Company Alerts/AUTH/NTLM/SSL*. Set the Login Name to your domain username. Set your outgoing SMTP server name accordingly (you can use the IP address), and choose Port 25.

To configure an IIS email account for authentication but not secure sockets, follow the account description with "/AUTH/NTLM" as in: *Company Alerts/AUTH/NTLM*. Set the Login Name to your domain username. Set your outgoing SMTP server name accordingly (you can use the IP address), and choose Port 25.

To configure an email account that uses authentication but not secure sockets, follow the Email Account Description with "/AUTH/LOGIN" as in: *Company Alerts/AUTH/LOGIN*. Set the Login Name and password as needed. Set your outgoing SMTP server name accordingly, and choose Port 25.

Test Your Email Account (Part I)

Test your email sending account by sending an email message from outside of the Perspective Workflow application.

Log on to the account which Perspective Workflow will use to send email alerts and then send a message to yourself and to someone else. Once you have successfully completed this test, move on to part II of the test (below).

Test Your Email Account (Part II)

1.   Start the Perspective Workflow service.

2.   In the Administrator, single click the "Email Accounts" branch.

3.   Single click the email account you just set up.

4.   Click on the "Perform Email Test" button. Key in an email address (you might wish to test sending to both yourself and someone else).

5.   Log into the Perspective Workflow Monitor and watch the branch called "Email Delivery." You should see your email go from "Pending" to "Sent Today". If the email appears in "Errors Today" (or never leaves "Pending"), there is an error in the configuration of the email sending account.

6.   If the email fails, stop the Perspective Workflow service and review the email account set-up; contact Technical Support if needed. Once you have re-configured the email account, you do not need to re-submit the test as the previous test will still be "pending."

Using Dial-Up Networking

If your organization does not maintain a permanent connection to the Internet, you may use Perspective Workflow's "Dial-Up Networking" option to automatically dial a modem and connect to the Internet when event email needs to be sent.

To use this function, click on the "Dial-Up Networking" tab, select the field titled "Use Dial-Up Networking for Email" and fill out the following three fields:

•   Dial-Up Networking Profile Name to Use: The name of the Dial-Up Networking connection profile that you wish to use.

- User Name: The login user name for this account.

- Password: The password of this user.

Note that Perspective Workflow will use dial-up networking only if it detects that an Internet connection is not currently present.

Using Multiple Email Accounts

You may wish to use multiple email sending accounts if:

- You wish to distribute the workload of sending many email messages.

- You wish to have different "sending" names associated with different outgoing messages. (E.g., "Employee Alerts" and "Supervisor Alerts.")

- You wish to have different "reply to" addresses associated with an email message (e.g., some events should be replied to at "alerts@yourcompany.com"; whereas other events should be replied to at "reports@yourcompany.com."

Fax Sending Account

To configure Perspective Workflow to send faxes, you must set up one or more faxing accounts.

1. Expand the "Software Setup" folder and select "Fax Accounts."

2. Click on the "New Fax Account" button. This is where you set up the accounts that Perspective Workflow will use when sending fax alerts. (To modify the details of an existing fax account, double-click on the account on the right side of your window.)

3. Fill in the fields as follows:

    - Fax Account Name: A description of the account.

    - Coverpage Filename: The name of the cover page to be used with this fax. (Cover pages are defined separately within the "Fax Cover Pages" option.)

    - Maximum Retry Attempts: The number of retries attempted for a single fax when a "No Answer" or "Busy" signal is received. Once the "Maximum # of Retries" is reached, the Fax will report an error.

- Active: Whether this account is available for sending faxes.

- Fax Machine Identification: The name of the fax machine.

- Banner: The heading that appears on all sent fax pages.

- Sending Company Name

- Sending Department/User

- Sending Fax Number: The number from which the fax is sent.

- Voice Number: The voice telephone number associated with the fax.

- Notes
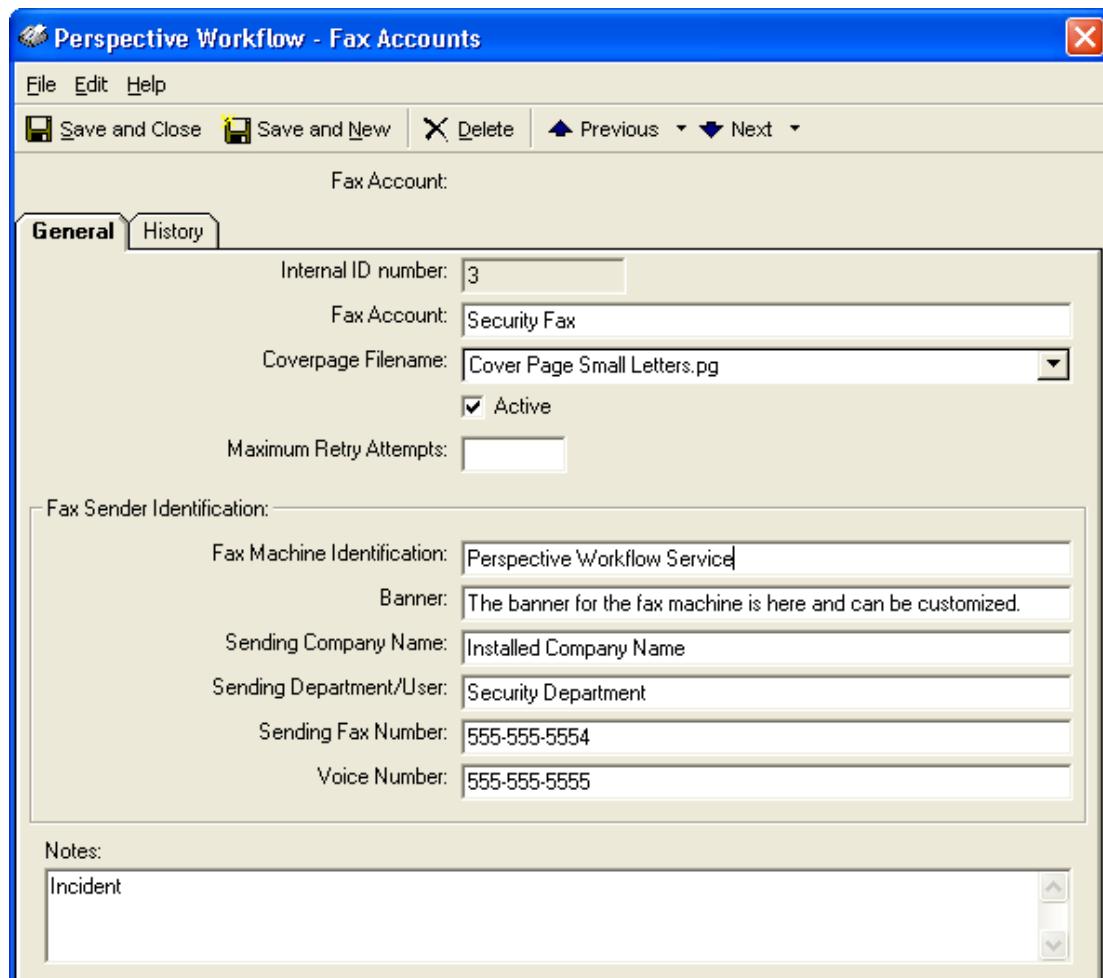
Multiple Fax "Sending" Accounts

You may wish to configure multiple fax sending accounts if:

- You wish to have different fax machine names associated with different outgoing messages, such as "Security Fax" or "Safety Fax."

- You wish to have different company, department or voice numbers associated with a fax message.

Fax Cover Pages

This option refers to the cover pages for Perspective Workflow's embedded faxing technology and does not currently offer customization. To customize your own fax cover pages, please use Perspective Workflow's integration with Microsoft Fax.

Holiday Schedule

You have the option to specify whether or not an event will be submitted if it falls on a holiday. To define a holiday, click on the "Holiday Schedule" branch and then click on the "New Holiday" button. To edit the configuration of an existing holiday, double-click the holiday in the window on the right.

For each holiday, you have access to the following fields of information:

- The holiday name (e.g., "Christmas Day").

- The holiday date (entered in the format "XX/XX/YYYY").

- Whether the holiday falls on the same numeric date every year (e.g., Christmas always falls on December 25th).

- Whether the holiday is currently active, thus enabling an event to be configured to observe that holiday and not be submitted.

Note that each event may be configured to either run or not run on a holiday.
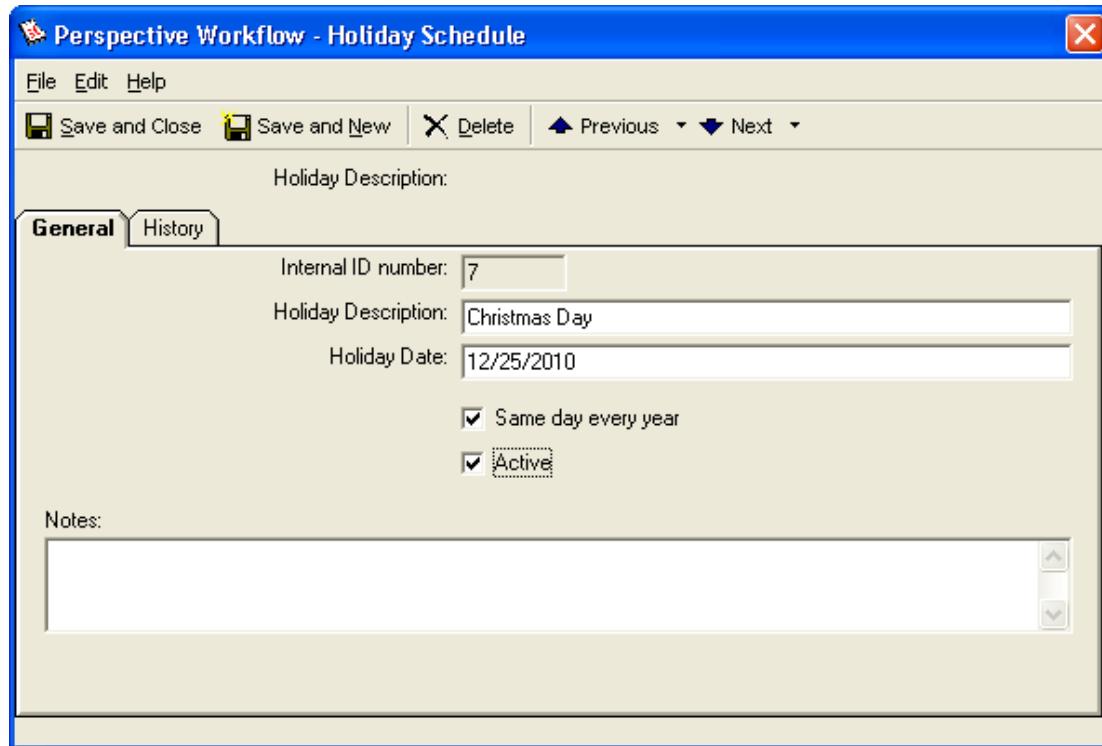
Paging Services

Perspective Workflow supports SMS paging.

To send alerts via pager, you need to identify the paging services that Perspective Workflow will use. Perspective Workflow's paging function requires only a modem reachable from the server on which Perspective Workflow is installed.

Perspective Workflow may also be configured to send pager messages using email, as most paging services allow mail to be sent to a specific pager number at the pager service. Contact the pager service provider for details.

1. Expand the "Software Setup" folder, and click on the branch called "Paging Services."

2. Click the "New Paging Service" button. (To modify the details of an existing pager service, double-click the account on the right.)

3. Fill in the fields as follows:

    - Paging Vendor: E.g., "Skytel".

    - Service Description: E.g., "Skytel Pager Service".

- <u>Paging Station TAP Phone Number</u>: The access number for this service.

- <u>Password</u>: The password (if any) required to access this service.

- <u>Baud Rate</u>: Contact your paging service.

- <u>Parity</u>: Contact your paging service.

- <u>Data Bits</u>: Contact your paging service.

- <u>Stop Bit</u>: Contact your paging service.

- <u>Characters Per Block</u>: Contact your paging service.

- <u>Customer Support Number</u>: The support number of your paging service.

- <u>Active</u>: Whether this paging service is available for use.

- <u>Notes</u>: Notes about this paging service.
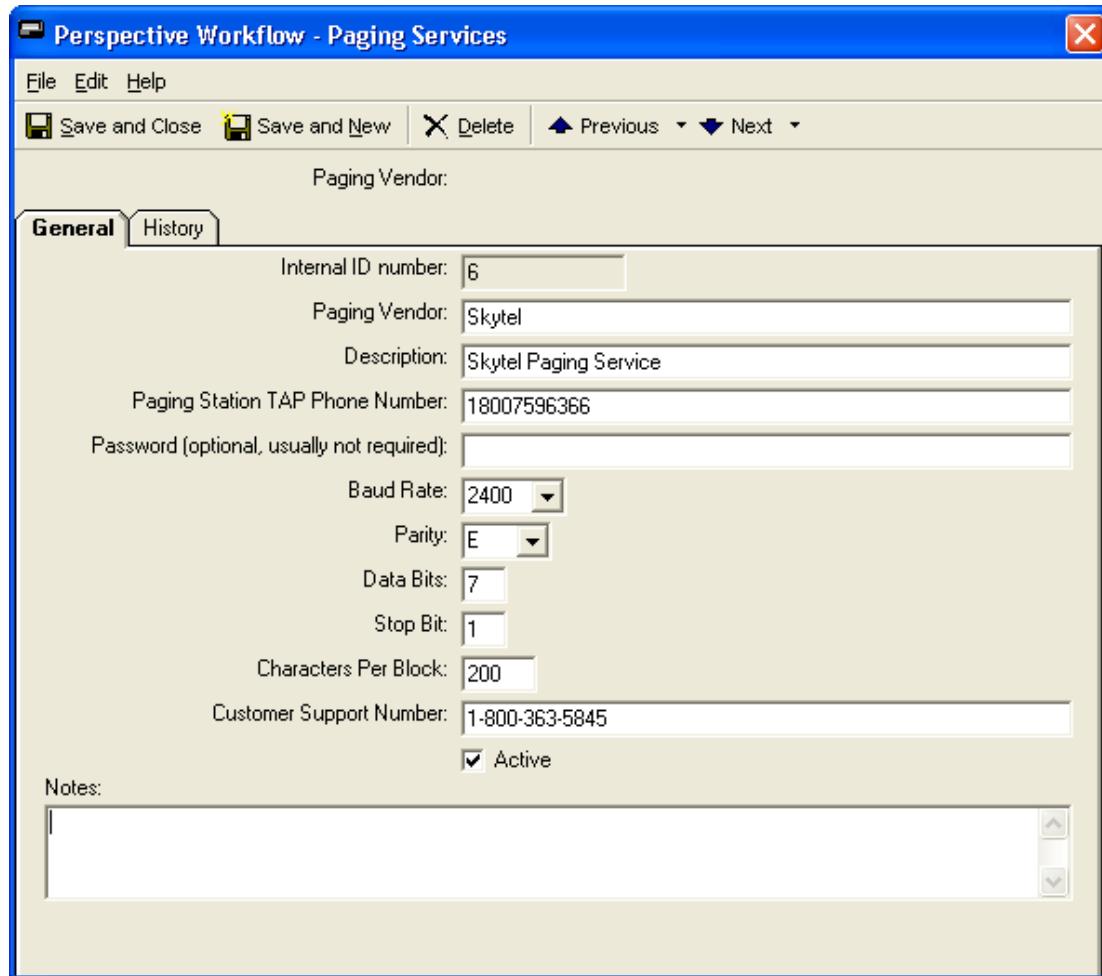
Webcast (Dashboard Alert) Locations

Please refer to the chapter titled "Dashboard Alerts (Webcasting)" for complete details on the configuration and use of this module.

User Access: Logins

Under the branch titled "User Access," click on the Logins sub-branch. This is where you control Perspective Workflow user access privileges.

Click the New Username button, or to modify the details of an existing user authorization record, double-click the corresponding record.

The General Tab

The General tab is where you can define a user's Perspective Workflow username and password. Specify the following:

- Login Name: The name the user will log into Perspective Workflow with.

- Description: The user's full name.

- Active: Whether this user is granted access to the selected modules.

- Set/Change Password: Click this button to password protect this username. Passwords may be 1-14 characters in length and are case sensitive.
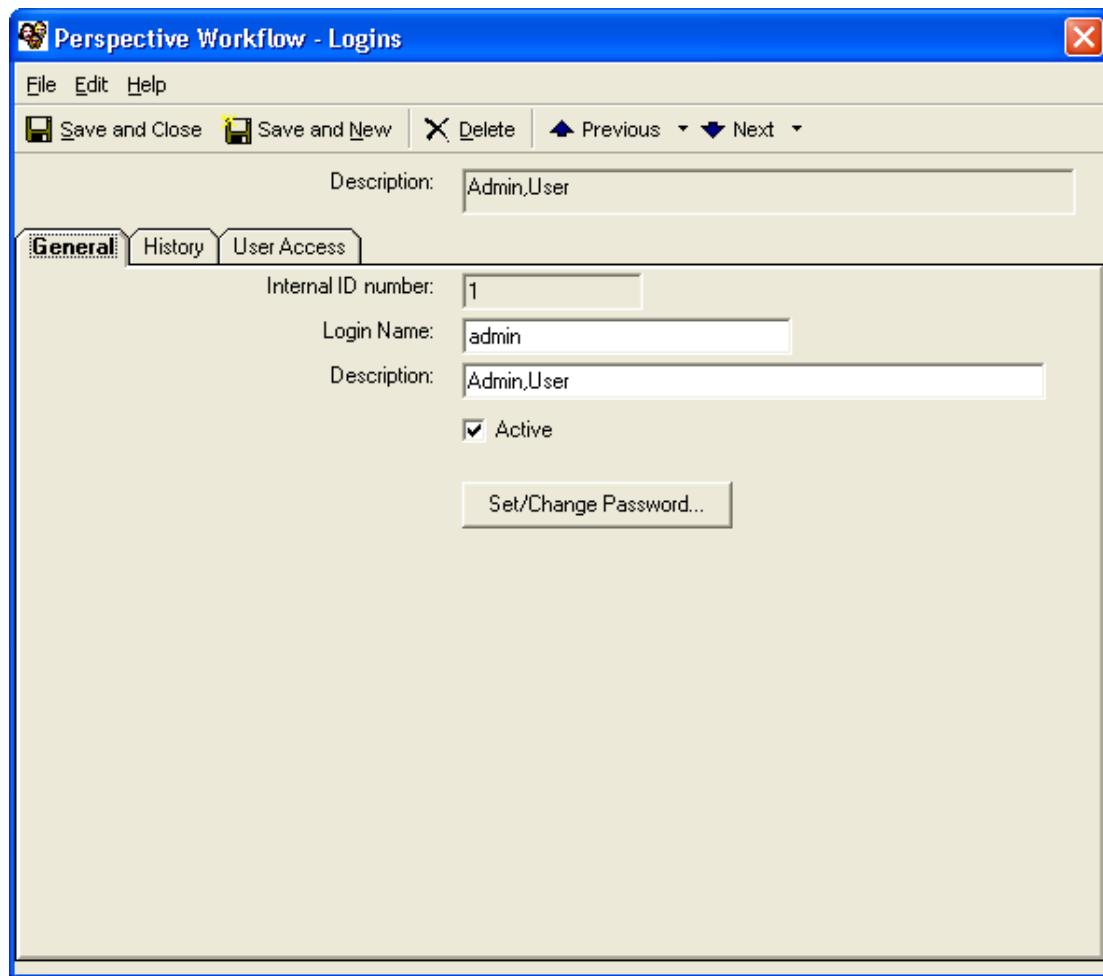
If you accidentally change authorizations so that no one can access Perspective Workflow, contact PPM 2000's Technical Support department for assistance.

The User Access Tab

The User Access tab controls which Perspective Workflow modules and functions a user has access to. The options are divided by application module (the Administrator, Event Manager and Monitor). Note the following:

- If you give someone access to the User Access option, they can modify the authorization settings for himself/herself and for any other users.

- It is strongly suggested that you limit who has access to Perspective Workflow.

- Exercise extreme caution in allowing access to "Submit SQL" and "Run Program" as these options can add, update or delete data from applications.
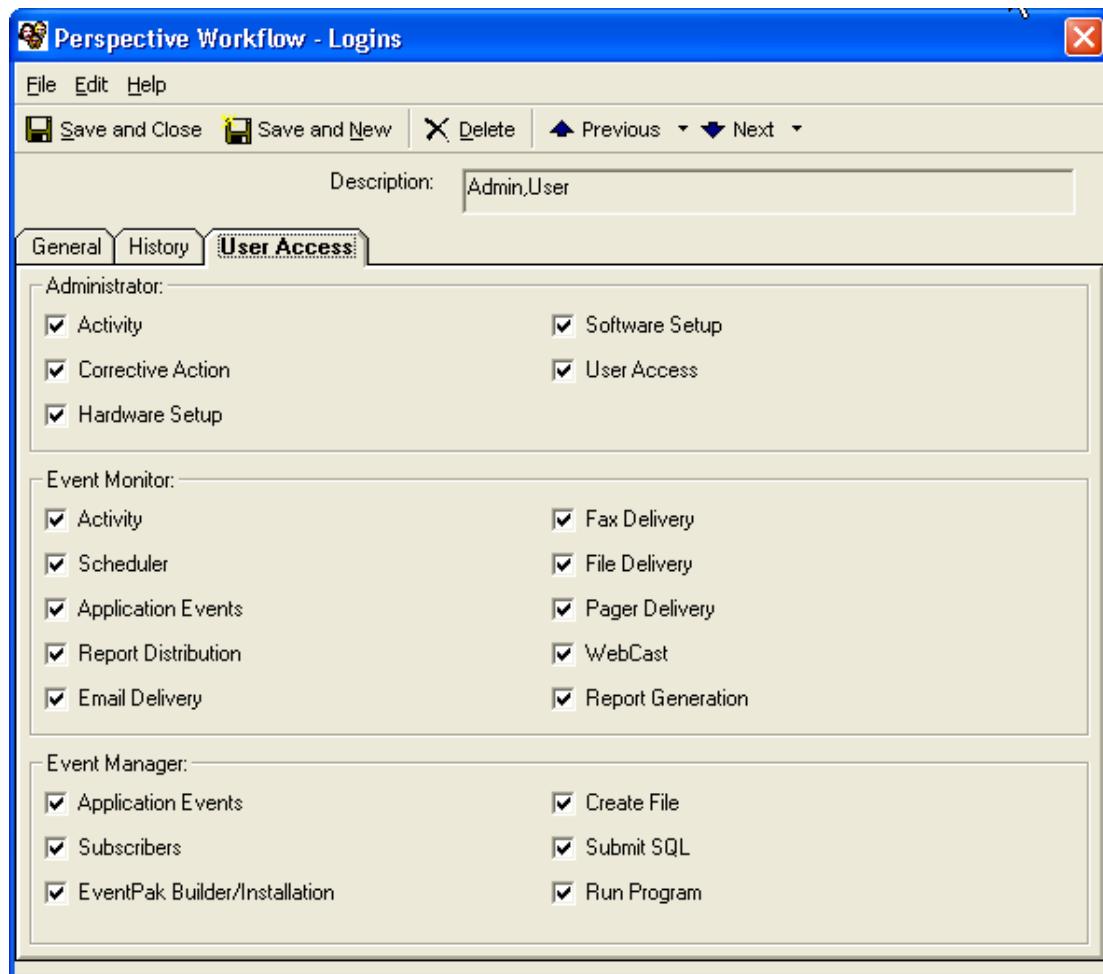
Database Tools

The final administrative functions located under the File menu are:

- Remove Completed Items

- Remove Pending Items

- Compact Database

Remove Completed Items

Depending on how you have configured Perspective Workflow, the amount of history that the system retains can grow quite large. The option to Remove Completed Items allows you to manually remove select history from the database.

(This option must be enabled if you are running the Microsoft Access® version of Perspective Workflow; it is optional if you are running the Microsoft SQL Server® version.)

The removal process may be done on either an ad-hoc manual basis, or you may schedule it to occur automatically on a periodic basis.

To manually remove completed items from the database, follow these steps:

1.   Shut down the Perspective Workflow service.

2.   Make sure that no other users are logged onto the application.

3.   Click on the Perspective Workflow Administrator File menu.

4.   Select Database Tools.

5.   Select Remove Completed Items. A new window will open.
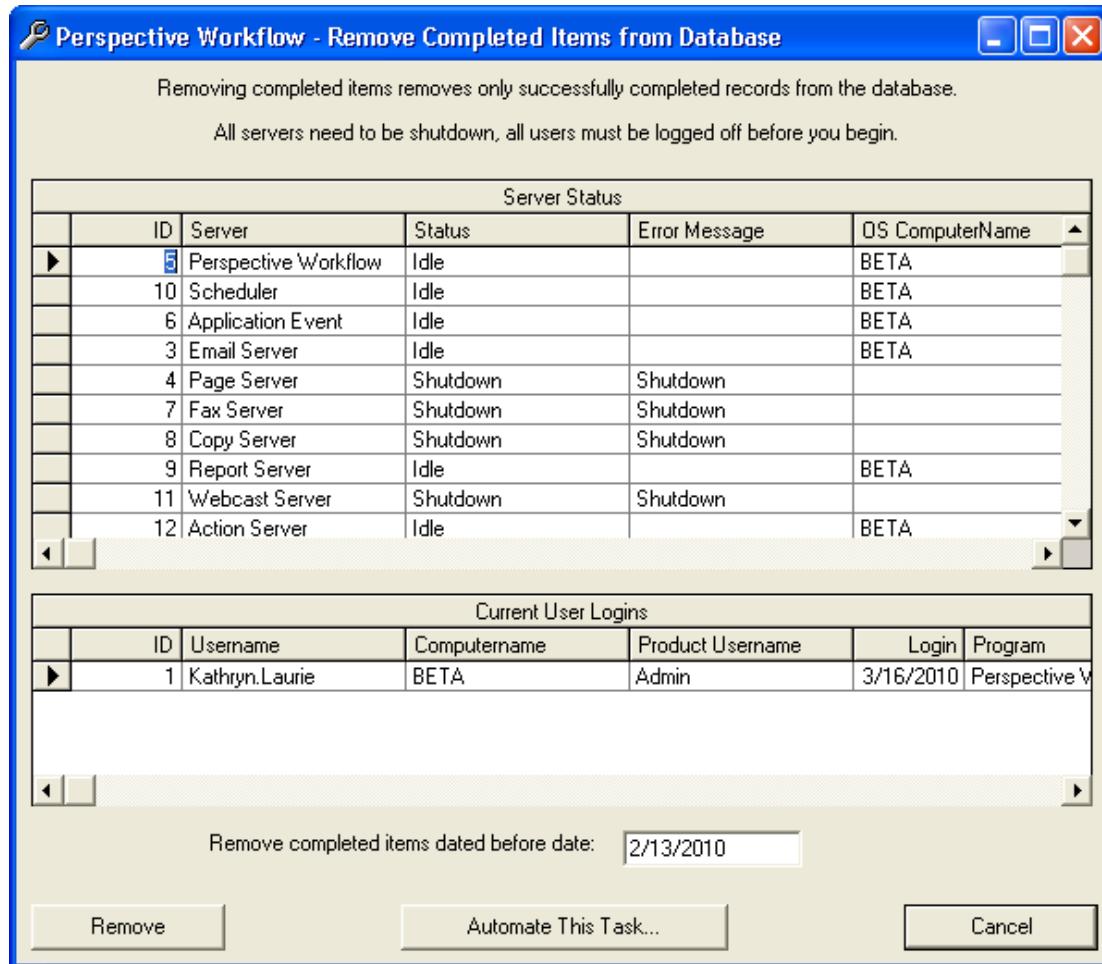
6. Type in the date prior to which you wish to remove all Perspective Workflow history of completed items. (This information will be removed from the database and cannot be restored.)

7. Click the Remove button.

    Note: If one or more Perspective Workflow servers are not shut down, you will receive the message, "3356 You attempted to open a database that is already open..."

Perspective Workflow Backup

The option to "automatically remove completed items" from Perspective Workflow not only is a way to automate this process, it also is an automated backup of the Perspective Workflow Access database files.

(Note that if you are running Perspective Workflow under SQL Server, you still need to configure your SQL backup to capture the Perspective Workflow SQL data files.)

Important: By default, this function is <u>turned on</u>, with this process running every night at 1:03 AM and removing all history that is more than 30 days old. You may disable this function if you are running Perspective Workflow under SQL Server and wish to retain more history online.

To automate the removal of completed items, follow these steps:

1.   Click on the Perspective Workflow Administrator File menu.

2.   Select Database Tools.

3.   Select Remove Completed Items.

4.   Click Automate This Task. A new window will open.
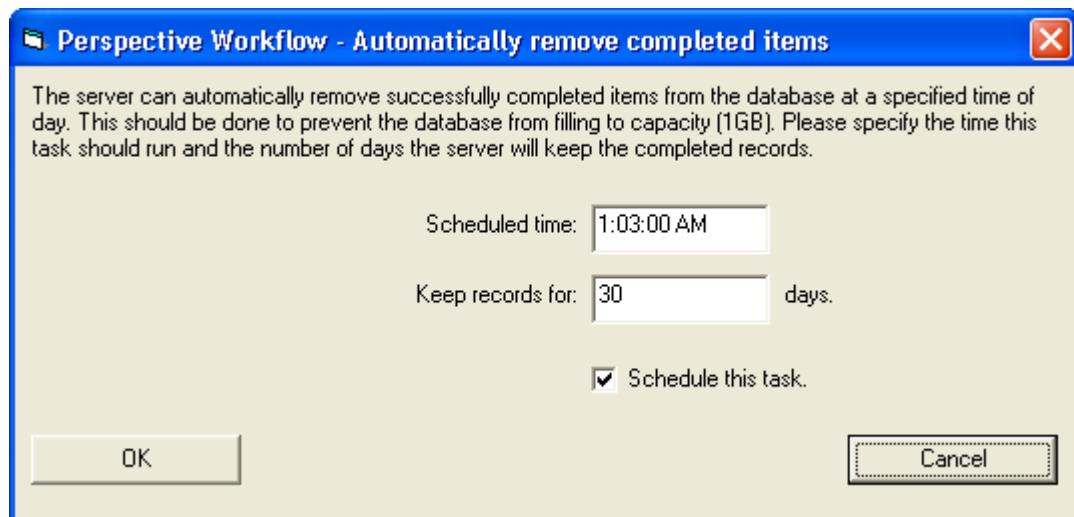
5.   Specify the daily time of day that this procedure will run.

6.   Indicate how many days worth of history to retain.

7.   Click OK.

If you are running Perspective Workflow under an extremely heavy load (e.g., 50 or more events running every few minutes, sending alerts to 100+ subscribers and executing very sophisticated workflow), you may wish to decrease the number of days of retained history to ten (or so) to optimize system performance.

Likewise, if you wish to retain a few months worth of history online, you may wish to increase the number of days of retained history to sixty or ninety days.

Backed Up Files

Perspective Workflow's backup procedure makes copies of the files stored in the following folder: C:\Program Files\PPM 2000 Inc\Perspective Workflow\Data.

PPM 2000 suggests a nightly job that either makes copies of the files in this folder, writes them out to a tape backup, or otherwise safeguards them for later use, if necessary.

Remove Pending Items

The option to "Remove Pending Items" allows you to remove items (such as pending email messages, faxes, pages, reports, actions, etc.) from Perspective Workflow. This option is particularly useful if you wish to delete pending error records.

This option must be used underlined carefully, as once you remove a pending item, it will not be executed by Perspective Workflow and there is no "undo" function for this option.

To remove pending items, follow these steps:

1.   Shut down the Perspective Workflow service.

2.   Make sure that no other users are logged onto the application.

3.   Click on the Perspective Workflow Administrator File menu.

4.   Select Database Tools.

5.   Select Remove Pending Items. A new window will open.
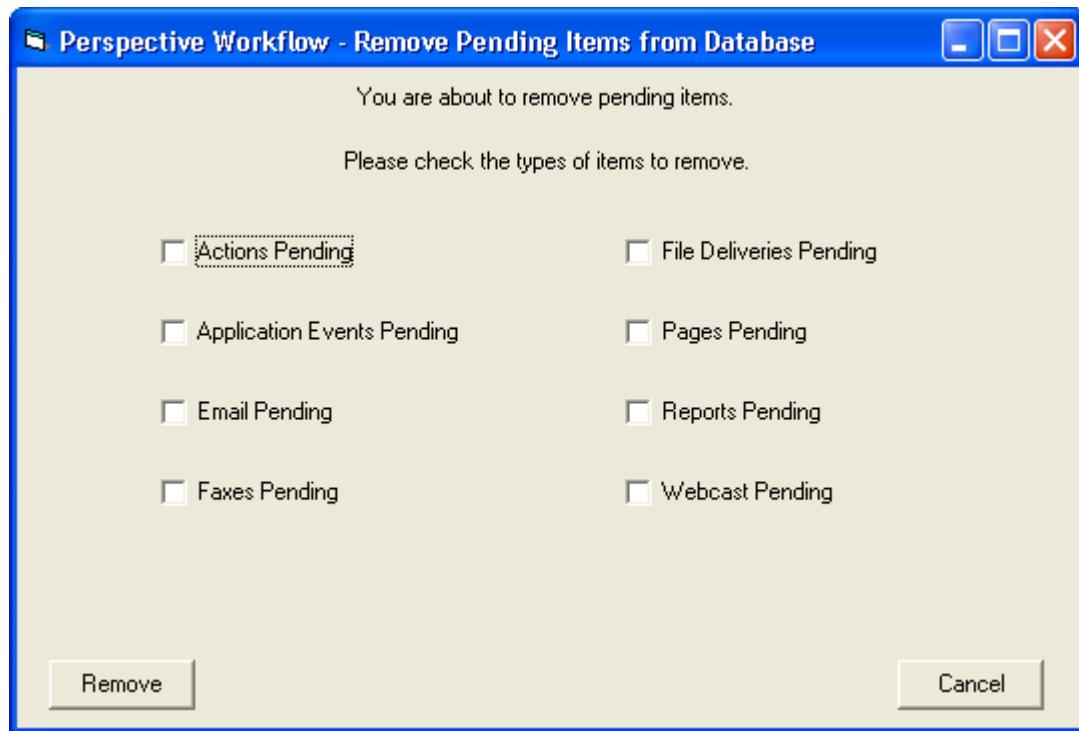
6. Select the types of items you wish to remove. Choose from:

   - Actions

   - Application events

   - Email, fax, pager and Webcast messages

   - Report generation requests

   - File delivery requests

7. Click the Remove button.

8. Click on Yes to confirm the removal.

9. Select the Compact Database option after removing pending items.

Compact Database

(Note that this option is not needed if running Perspective Workflow under SQL Server.)

Compacting the database is advised after you delete records from the database as this option will remove any unnecessary space from the database. Note that you'll need 3 times the size of the database in free disk space to compact the database.

To compact your database, follow these steps:

1.   Click on the Perspective Workflow Administrator File menu.

2.   Select Database Tools.

3.   Select Compact Database.

4.   Click the Compact button.

Note that you can delete the KS_*_[previous_year].mdb databases from your system.

Enabling Diagnostics

Perspective Workflow has the ability to record the steps that it takes when running events in a diagnostic file so that you can track down the cause of any errors or problems. Furthermore, you can turn "on" or "off" different aspects of diagnostic tracking.

To enable diagnostic tracking, stop the Perspective Workflow service and edit the registry on the Perspective Workflow server by running the following program:

REGEDIT

This will display the registry; navigate to:

My Computer\HKEY_Local_Machine\Software\PPM 2000 Inc\Perspective Workflow\General\Diagnostics

You may set the diagnostic value to the following possible settings:

0   No Diagnostics
-1   All Servers in Diagnostics
1   Main Server Diagnostics
2   Schedule Server Diagnostics
3   Application Server Diagnostics
4   Email Server Diagnostics
5   Page Server Diagnostics
6   Fax Server Diagnostics
7   Copy Server Diagnostics
8   Report Server Diagnostics

9   Webcast Server Diagnostics

10   Action Server Diagnostics

When done setting the diagnostic value, exit from the registry and restart the Perspective Workflow service.

The Perspective Workflow Diagnostics Log file will be written to:

C:\Program Files\PPM 2000 Inc\Perspective Workflow\Data\KS_Diagnostics.txt.

Unable to Start Server (Error 1053)

One of the most common error messages in Perspective Workflow is error number 1053: "The service did not respond to the start or control request in a timely fashion."

The first thing to do is to check the Event Viewer to review the Application Log. This should show you what occurred in the Perspective Workflow Service (KS_SERV.exe).

One of the typical causes of this error is if someone changes the Perspective Workflow "Admin" password but has not changed the Server logon information. To address this, do the following:

1.   Log into the Perspective Workflow Administrator.

2.   Click on the Server Logon Information button.

3.   Confirm (or modify) the Admin user name and password.

To change the password for the "Admin" user:

1.   Log into the Administrator.

2.   Select the option for User Access.

3.   Select Logins.

4.   Double-click on Admin.

5.   Choose the General tab.

6.   Choose Set /Change Password.

You should also verify that the "Admin" user has the appropriate access options checked under the User Access tab.

ACTVMSG_ERR_NOT_FOUND (Error 8139)

This Perspective Workflow error is typically due to one of five things:

- You are using "mapped drives" in specifying the location of a file.

- You are specifying an attachment file that Perspective Workflow cannot locate.

- Perspective Workflow cannot find your Exchange server.

- Perspective Workflow cannot find the Exchange mailbox you have specified.

- Perspective Workflow cannot find the Outlook profile you have specified.

ACTVMSG_ERR_FAILURE (Error 8002)

This Perspective Workflow error is typically due to one of the following:

- CDO (Collaboration Data Objects) is not installed.

- The Perspective Workflow service is not running from a valid domain/username.

- The Perspective Workflow service user has insufficient privileges to access email.

- You have an open Microsoft Outlook session on the Perspective Workflow server while Perspective Workflow is trying to send/receive email.

- A Microsoft Outlook security patch is installed (requiring you to hit OK every time Perspective Workflow tries to send email).

If you are not able to figure out the cause of this error, stop the Perspective Workflow Windows service and instead run the Perspective Workflow Desktop Service as this will re-direct all error messages to your interactive session.

Server Stays in Startup Mode

If, when you try to start the Perspective Workflow Service, a server does not get past the startup mode, do the following:

1. Stop the Perspective Workflow service.

2. Run 'dcomcnfg.exe'.

3. Click on the Default Security tab.

4. Check the Default Launch button as well as the other two buttons on this tab. If one user is listed for a category, all other users are denied access unless they are also entered in the corresponding category. If no users are listed, then all users have access.

5. Add the Perspective Workflow user if other users are listed. You may also need to run the Perspective Workflow service from a domain user account with local admin rights.

Query Designing

A Perspective Workflow query is the first component of an event; the query determines whether specific conditions exist within an application's database. Each event uses one (or more) queries and if the conditions of a query are met, the event is "triggered" and the resulting alerts, reports and workflow actions are executed. (Perspective Workflow can also use SQL triggers to detect data conditions.)

The majority of events use a single query; some events use multiple queries, especially events whose triggering is based on a combination of conditions that exist across multiple application databases.

There are three types of queries. The first is a record level query which checks for records that meet certain conditions. For example:

- Open incidents with an access level of 5.

- Assignments that are overdue for completion.

- Incident losses in excess of $25,000.

The second is an aggregate query, and it checks to see if a group of records collectively meet a certain condition. For example:

- More than 10 incidents with a category of "theft".

- Fewer than 5 incomplete assignments per security officer due next week.

- Investigators working on cases with total losses in excess of $25,000.

The third is a field-level change query, and it checks to see if one or more fields have had their value changed. For example:

- An incident's status has changed.

- An incident's access level has changed..

- An assignment that has a new due date.

Queries, VB Scripts & SQL Triggers

Perspective Workflow has four ways to identify data conditions:

- Queries: Queries extract data from any ODBC-compliant database.

- SQL Triggers: Triggers are built right into SQL databases and are particularly useful for identifying deleted records, but can also be used to identify "new" or "changed" records.

- Visual Basic scripts: VB scripts may be used to monitor data that is not stored within a database, such as O/S conditions (e.g., low disk space, the arrival of a file, etc.). See the "Visual Basic Scripting" chapter for details.

- Email: Perspective Workflow can parse through and detect conditions of data within incoming email messages. See the chapter titled "Email Response System" for details.

This chapter will focus on the design and use of queries to identify data conditions.

One Query in Multiple Events

Consider an organization that wishes to receive the following alerts:

- Investigators with greater than 2 active investigations.

- Investigators with greater than 4 active investigations.

- Investigators with greater than 6 active investigations.

These three alerts could each use their own query; each query checking for the corresponding investigation count.

But Perspective Workflow allows one query to be used in multiple events; a query in which the investigation count is specified on the event level.

Preparation

You'll find query design easier if you begin by identifying the event conditions that you wish to monitor.

Unless you know the underlined event conditions that you wish to monitor, it can be somewhat challenging to define the queries that need to be designed in support of those events. For each condition to check for, take the following steps in preparation.

Identifying Needed Database Fields

A query serves two purposes: it identifies what conditions have to be met for an event to be triggered, and it identifies which database fields may be used within an event. You need to consider:

- If an event sends alerts, the query needs to include those database fields that you might wish to include in the outgoing messages.

- If an event sends alerts to recipients whose address is located in a database field (e.g., sending an alert to an officer assigned to a call), the query needs to include the field(s) that contains the related notification address(es).

- If an event triggers one or more Crystal Reports, the query needs to include any fields used as selection criteria (report parameters).

- If an event executes workflow, the query needs to include fields whose values will be used in the workflow procedures.

Record-Level Queries

The first step is to identify the overall purpose of an event. For example: "When a new case is opened, send an email alert to the case supervisor."

If the event will send an alert message, consider what you'd like the alert messages about this event to look like. For example:

Hello Don Farber,

The following case was opened today:

Case Start Date: 03/14/2010 1:35 PM

Case Number: CASE-2010-00006

Status: Open

Case Category: External

Next, identify the data fields that you wish to put into the message:

Hello [CaseSupervisorFullName],

The following case was opened today:

Case Start Date: [StartedDateTime]

Case Number: [CaseNumber]

Status: [CaseStatus]

Case Category: [CaseCategory]

By identifying the data fields, you'll know what fields the query will need to retrieve data from.

By reviewing the event's description ("when a new case is opened…"), we can easily identify the conditions that the query needs to check for:

- Cases with a status of "Open".

- Cases that are opened today.

Next is the determination of who will be notified. In some cases, alert recipients are hard-coded (e.g., notifying the CEO or CFO). In other cases, you might wish to notify a person who is <u>associated</u> with a record being triggered as in the following: "Send an alert to the case supervisor when a new case is opened."

In this scenario, the alert recipient will depend on the assigned case supervisor for the case. If you look back on the alert message, you can see that the person who should receive the alert message is "[CaseSupervisorFullName]".

Since "[CaseSupervisorFullName]" is not an email address, Perspective Workflow will compare the "[CaseSupervisorFullName]" value to the subscriber lists which contain the user's email address.

Perspective Workflow events can also optionally generate and deliver forms and documents, as well as Crystal Reports.

If an event will trigger the generation of a report, review the report to see if it uses parameters (selection criteria). If it does, the fields containing the selection criteria must be included in the query.

The last preparatory step is to identify whether an event will execute workflow to add or update records in an application database. If so, your query must include the fields required for use by the workflow update procedure.

Aggregate Queries

Aggregate queries are designed in much the same way as record-level queries, except that aggregate queries will use one of the following five options:

- Count (e.g., fewer than 5 overdue assignments).

- Summarize (e.g., less than $10,000 in net losses).

- Average (e.g., average response time over 60 minutes).

- Minimum (e.g., lowest total losses for an incident).

- Maximum (e.g., highest total losses for an incident).

Aggregate queries should be designed with the same considerations as record-level queries, except for the fact that an aggregate query is going to be triggered by a condition related to a "group" of matching records. For example: "If an officer has more than 3 overdue assignments, send an email alert to the officer's supervisor listing the overdue assignments."

Design Basics

For every query, you should identify the following:

- Purpose of query.

- Alert message.

- Application tables which contain the data to be retrieved.

- Fields of data required by the query.

- Triggering conditions.

- Alert recipients.

Add/Edit a Query

To add a new query, open the Navigator module, expand the All Events branch and click on the Application you wish to add the query to. Then, right-click on the Application name and choose "New Query".

To view or edit an existing query, follow these steps:

1. Open the Navigator module, expand the All Events branch, and expand the application that contains the query you wish to work with.

2. Locate an event that uses this query and expand the event's sub-branches. (To view/edit a query that is not associated with an event, open the Event Manager module and display a list of all queries for an application.)

3. Right-click on the Query branch and select Edit.

4. The "Query Description" field contains a description of your query. Make your descriptions short, consistent and descriptive.

5. Click Active to enable this query to be used in an event.
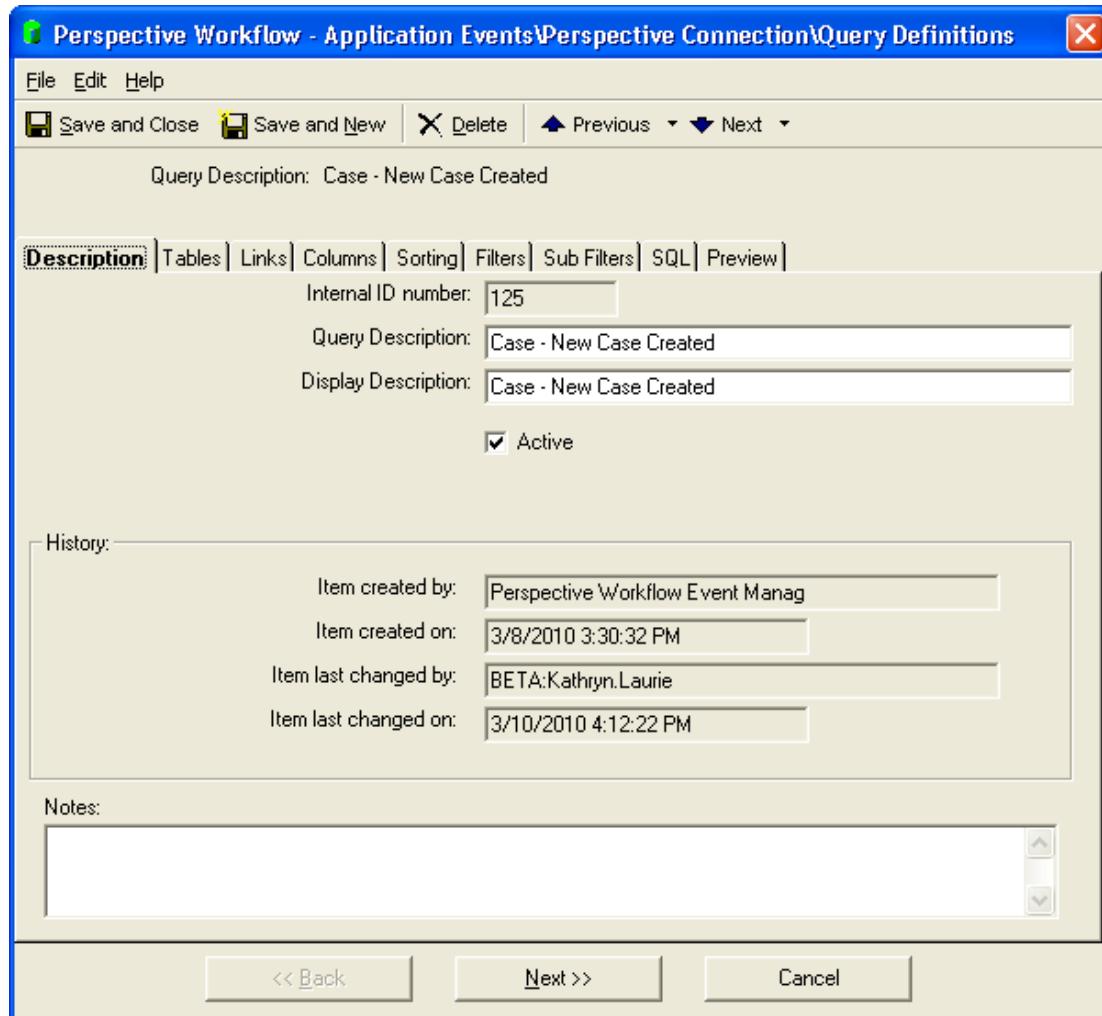
The following sections guide you through record-level queries, as well as field-level change queries. Following these instructions is a separate section on the creation of aggregate queries; this section goes over only the _differences_ between record-level and aggregate queries, so please review the record-level query section to become familiar with the basics of designing all queries.

Query Naming

Name your queries logically so that they can be easily located. And keep your query names short so they're easy to read in the Navigator. For example:

- Assignments; Overdue

- Assignments; Due in 3 Days

PPM 2000 suggests using a query's "primary data" as the first word of the description (e.g., "Assignments;") and then follow that with the query's condition.

Tables

The Tables tab is where you choose what database tables a query will retrieve data from. There are three items you need to consider:

1. What data might you wish to put into an alert message?

    Even a query as simple as "overdue assignments" usually needs to retrieve data from more than just the "assignment" table.

2. Where is the alert address of the person you wish to notify stored?

    If you wish to notify a person who is "associated" with a triggered record, you need to include the table(s) that contain these addresses.

3. Will an event that uses this query execute workflow?

    Since an event can execute workflow to add or update database records, you need to consider what data the workflow needs access to.

To select fields for a query, you first need to select the table(s) that contain these fields. Go to the list of <u>Available Tables</u> and double-click on the desired tables.
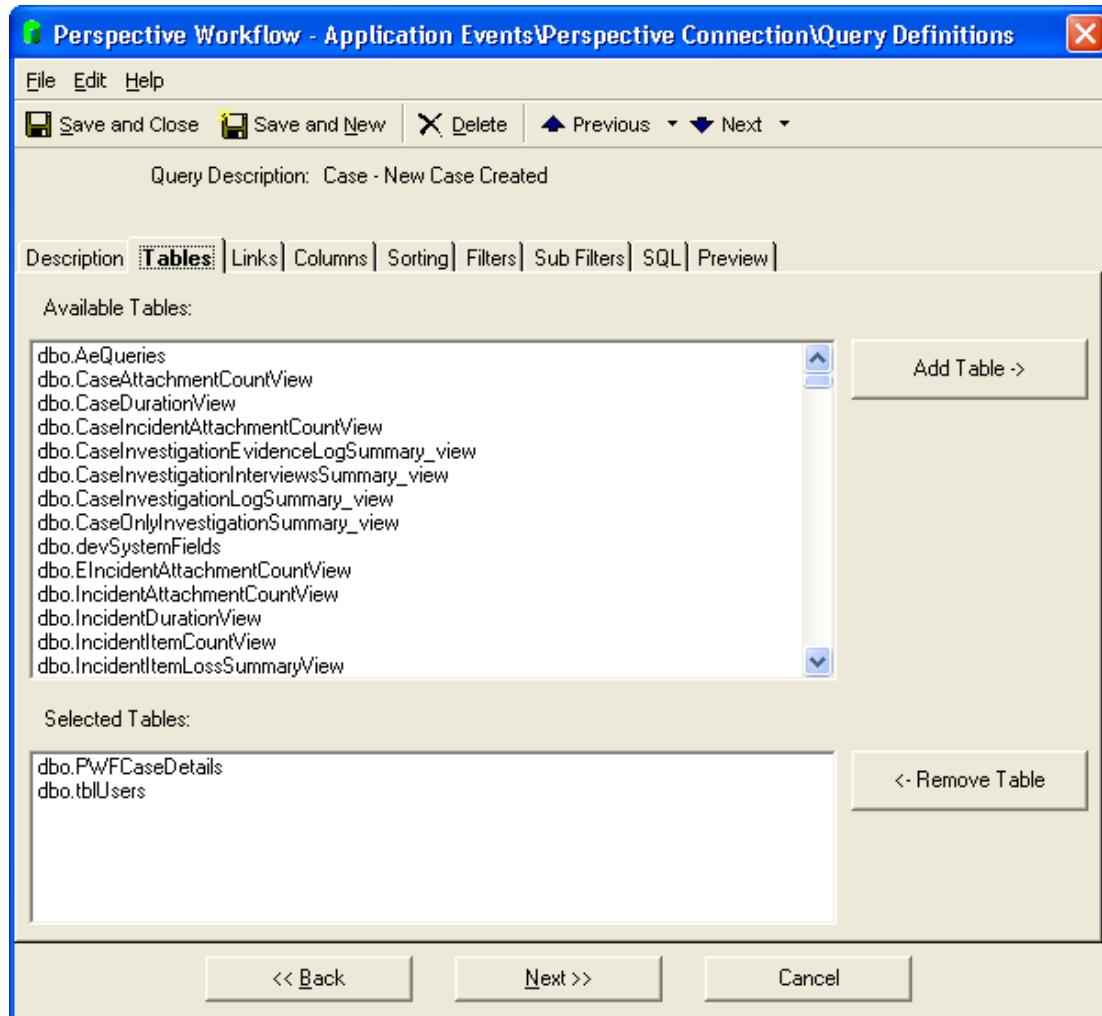
Choosing the Same Table Multiple Times (Table Alias)

Consider the following alert scenario:

You want an alert about assignments that are overdue. Each assignment contains the ID of the Assigned By Person (AssignedByPersonID) and the ID of the Assigned To Person (AssignedToPersonID). An additional "email" table contains the email addresses of both the Assigned By Person and Assigned To Person.

In order to get both email addresses, Perspective Workflow needs to access the "email" table twice—once for the Assigned By Person's address and once for the Assigned To Person's address. But you cannot choose the same table name twice, so Perspective Workflow lets you create a "table alias" for just such occasions.

When you select the same table multiple times in the Tables tab, you are given the ability to specify an alias name for that same table.

Once you enter an alias name, you will see the table's alias followed by an exclamation mark and then the table's original name.

Links

If you have chosen more than one table, you must tell Perspective Workflow how those tables are linked (or "joined") together. It is essential that you choose the query's <u>primary</u> table first in your series of links.

Link your tables by doing the following:

1.   Click the Links tab.
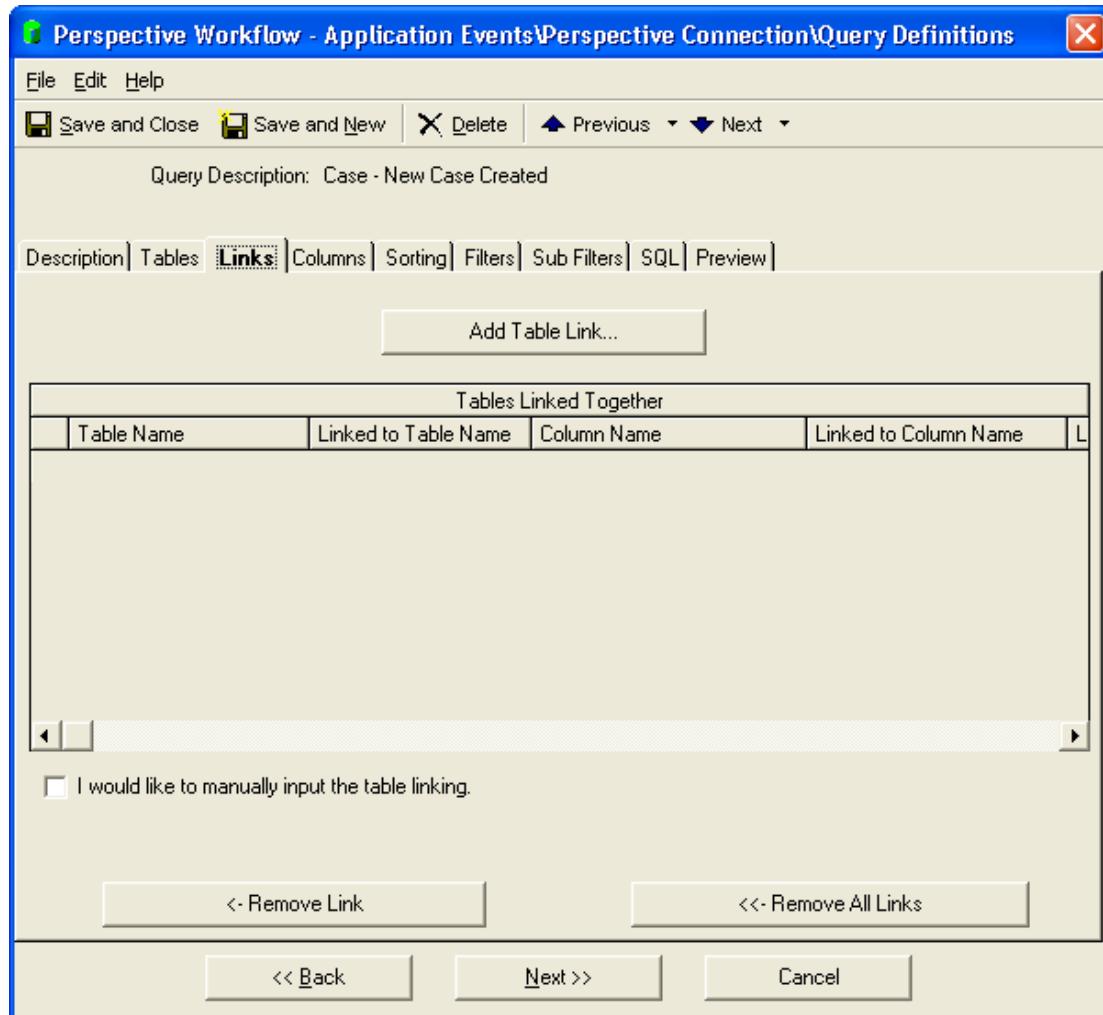
2.   Click Add Table Link.
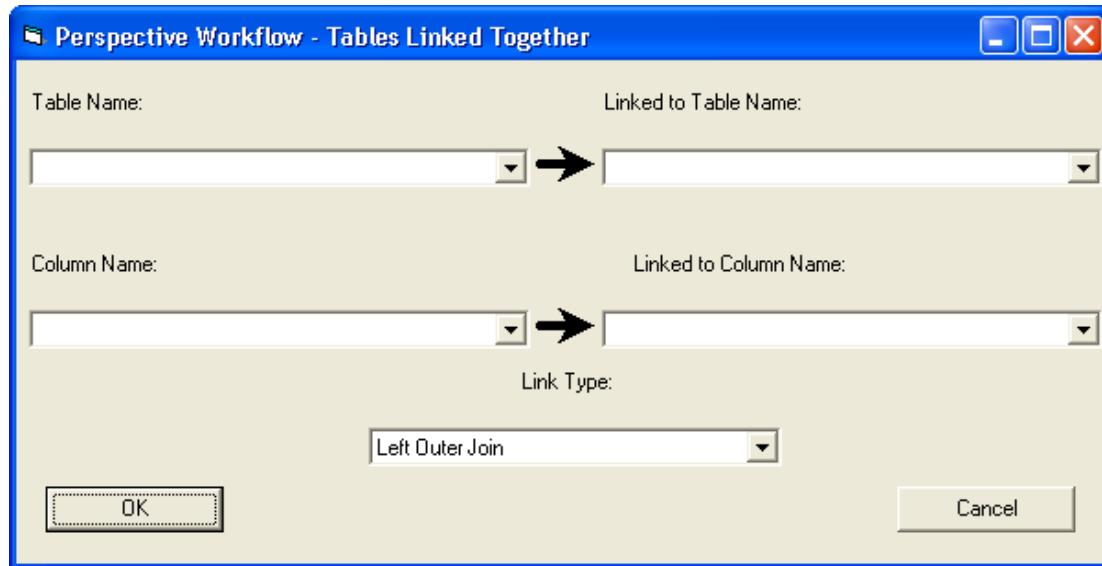
3. In "Table Name," select the query's <u>primary database table</u>.

4. In "Linked to Table Name," select a corresponding table.

5. In "Column Name," select the "link from" field.

6. If a column in the "Link to Table" is found with the same name as the "Link from Table," that field will be loaded into the "Linked to Column Name".

   (If not) The "Linked to Column Name" field will be left blank and you may select the appropriate column from the drop-down list.

7. The link type will default to "left outer join"; leave this unless your database schema specifically requires a different type of join.

8. Click OK.

9. If you have more than two tables that require linking, click on the Add Table Link button again and repeat this process until all tables are linked.

Overriding the Default Linking Syntax

Depending on the applications, databases and ODBC drivers you are using, you may come across an instance where Perspective Workflow's default linking syntax is not sufficient for the type of "join" you wish to create.

To do so, follow these steps:

1.   Join the two tables together using the table linking wizard.

2.   Click on the SQL tab.

3.   Copy the "join" syntax (everything after the word "from"). Do not include the parentheses that begin and end the join syntax.

4.   Click back on the Links tab, click on the checkbox titled "I would like to manually input the table linking." A blank line will appear.

5.   Paste the "join" syntax that you copied from the SQL tab into this line.

6.   Edit this syntax to perform the join as you require.

You may also directly edit the field names in the Links grid, as detailed below.

Modifying Your Links

Once you have chosen your links, you can modify them as follows:

1.   Do <u>not</u> select "I would like to manually input the table linking".

2.   Go to the link line you wish to modify.

3.   Click your cursor in any of the 5 linking fields.

4.   Edit the value of the field you clicked in. Any valid SQL syntax is supported in these fields.

Multi-Field Links

To link one table to another using more than one field, follow these steps:

1.   Create a link using the first of the two fields you need to link with.

2.   Click in the "Linked to Column Name" field so that your cursor is flashing at the end of the column name in this field.

3.   Add a blank space after the column name.

4.   Type in "and table1.2nd_link_field = table2.2nd_link_field".

In place of "table1.2nd_link_field", key in the secondary linking field in the first table, and in place of "table2.2nd_link_field", key in the secondary linking field in the second table. Do not include the quotation marks in your syntax.

Columns

There are four items to remember when choosing a query's columns:

1. What data do you wish to put into an alert message?

2. Do you need to include fields that contain the alert address(es) of person(s) you wish to notify?

3. Will an event that uses this query execute some sort of workflow?

4. What order do you want matching records listed in?

If No Columns Are Displayed

1. If Perspective Workflow does not display any columns, it may be because your tables have embedded blanks within the table names. If this is the case, follow these steps:

2. From the Navigator, right-click on the branch that contains the name of the application you are working in and choose "Properties".

3. Click on the "Edit connection" button.

4. Change the value for the "Long Tablename Left" and "Long Tablename Right" characters to the double quote (") symbol.

5. Save and Close your work.

6. Go back to the "Columns" tab and check to see if the column names appear.

7. If the column names still do not appear, please contact PPM 2000's Technical Support department for further assistance.

How to Select Columns

Follow these steps:

1.   Click on the "Columns" tab.

2.   Go to the list titled "Available Columns to Query".

3.   Double-click on the field you wish to include, or single-click on the field you wish to include and click on the "Add Column to Query" button.

4.   Repeat this process for each column you wish to select.
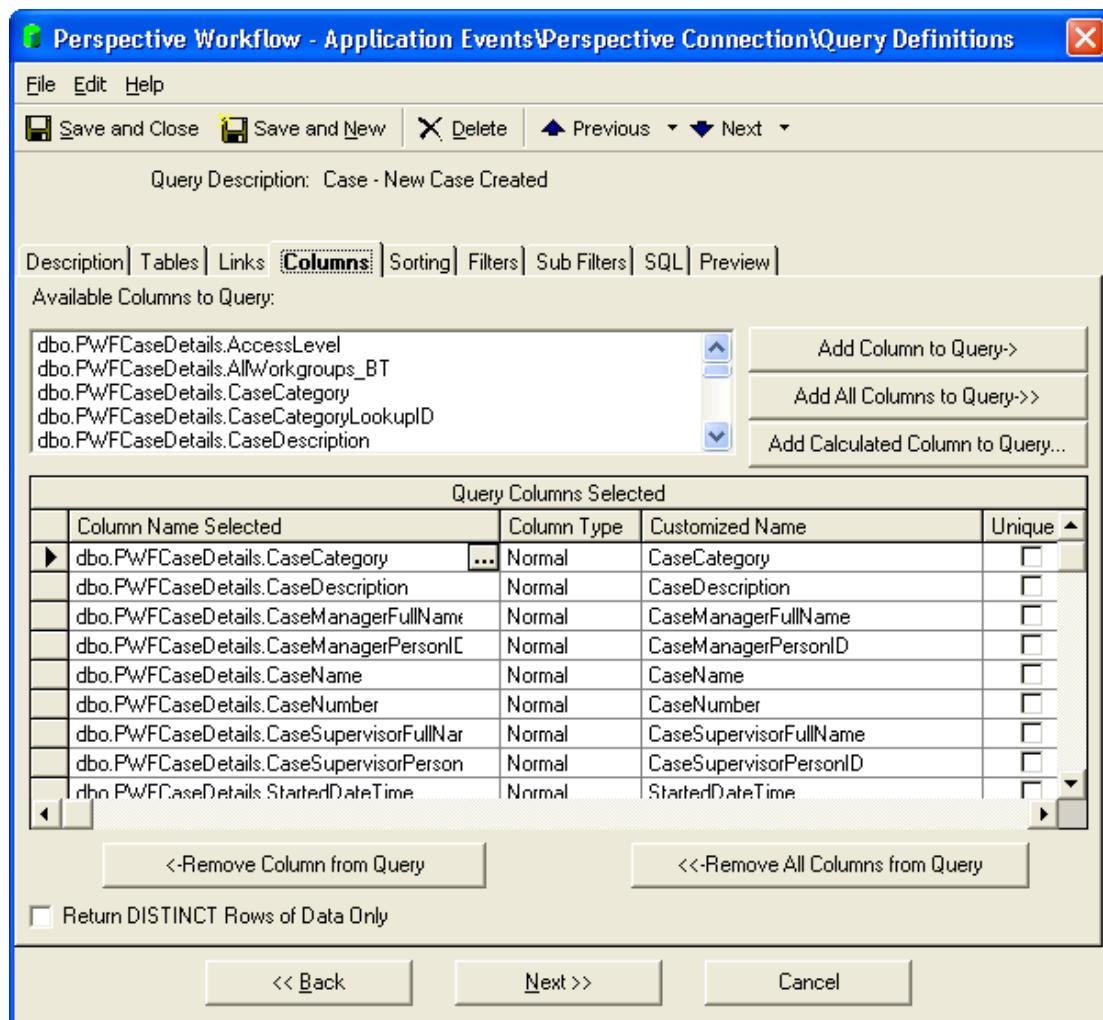
Selecting All Columns

To include all columns, click on the button called "Add All Columns to Query."

Although this is an excellent way to see all data from all columns, this is <u>not</u> suggested for normal query building as it puts a higher burden on system resources.

<u>Editing a Selected Column</u>

To edit a column (to include calculations, change its format, etc.), click on the "Column Name Selected" field within the grid and an "Edit" button (a button with three dots in it) will appear. Click on this button and you will be taken into a full-screen editor, complete with advanced calculation functions to choose from.

Column Type

Record-level or field-level change queries always use a column type of "Normal".

Customized Name

When an event's alert message is designed, you refer to the query's columns by using the columns' Customized Names. This is important, as some applications have cryptic names for their columns. For example, an "assignment" table may have a column called "ddate" that stores the assignment's due date.

Using a column's "Customized Name", you can create your own "label" for a field, for example "due_date" for the scenario above.

When you select a column for a query, Perspective Workflow will take the column's name and place it in the "Customized Name" field. You can then modify that value.

Here are some notes about using customized names:

- Do not include blank spaces. (use "due_date" and not "due date").

- Keep customized names under 25 characters.

- Do not begin a customized name with SQL reserved words, such as "sum", "sub", "add", "avg", "min", "max", "total", "trim", and "format".

- Do not have multiple fields with the same customized names; you won't be able to tell them apart.

- Use only letters and numbers in a customized name; do not use symbols.

- Do <u>not</u> change the default Customized Name of a query's "unique" column if the query tracks <u>changes</u> to the value of one or more database fields.

The Unique Column

Perspective Workflow events can trigger "once" or "repeatedly". Consider an event that checks hourly for overdue assignments:

1. Once: At 9 AM, an assignment for Incident #123 is overdue and triggers. At 10 AM, the assignment is still overdue, but since it already triggered, it does not trigger again.

2. Repeat: At 9 AM, an assignment for Incident #123 is overdue and triggers. At 10 AM, and every hour after, until it's no longer overdue, it triggers again.

One time versus repeat alerts is specified on the <u>event</u> level. However, to enable a query for one-time alerts, you must tell Perspective Workflow how it can remember a record that has been triggered. This is done on the <u>query</u> level.

If you do <u>not</u> specify how a query remembers a triggered record, any event that uses this query will automatically be in "repeat" mode. If you <u>do</u> specify how a query remembers a triggered record, you will have the option (on the event level) to specify one-time or repeat.

To specify how a query remembers a triggered record, you specify the <u>one column</u> that uniquely identifies a matching record, such as a user ID or incident number, by placing a checkmark in the "Unique" column of your query.

Note the following:

- Always specify a unique field for all non-aggregate queries.

- Only <u>one</u> column may be checked as unique. If a unique is based on the combined values of two or more fields, create a multi-field unique (see "Multi-Field Unique").

- Do <u>not</u> change the default Customized Name of a query's unique column if the query tracks <u>changes</u> to one or more database fields.

<u>How a Record Gets Triggered (& Un-Triggered)</u>

Consider an event that runs daily and sends a non-repeating alert about officers with more than 5 incomplete assignments.

On Monday, Jim Brown has 5 incomplete assignments and an alert is sent. On Tuesday, Jim Brown still has 5 incomplete assignments. The event (set to "not repeat") runs but does not trigger another alert about Jim Brown.

On Wednesday, Jim Brown only has 4 incomplete assignments. The event runs, sees that Jim Brown no longer meets the event's criteria, and "clears" ("un-triggers") the Jim Brown record. On Thursday, Jim Brown once again has 5 incomplete assignments. The event runs, is triggered again, and another alert is sent.

Multi-Field Unique

To create a multi-field unique, you'll need to concatenate (combine) the values from the two (or more) fields. Note the following about concatenation:

- The "type" of fields you concatenate must be "character" or "string" type fields. To concatenate fields of other types (e.g., numeric or date), you must convert the fields into character format first. (See "Field Editing Notes".)

- The maximum length of a unique column for a query is 64 characters.

To concatenate fields (for SQL Server), follow these steps:

1. Click on the button called "Add Calculated Column to Query".

2. Choose the first database column that you wish to comprise your concatenated unique.

3. Click in the Calculated Column Workbox and enter a plus sign (+) after the column name you have selected.

4. Choose the second database column that you wish to comprise your concatenated unique.

The concatenation symbol for an Oracle database is two vertical bars (||).

Please note that you cannot use a concatenated unique if your query is checking for a "change" to the value of one or more fields in a database.

Calculated Fields

Calculated fields may be used as selection criteria, in an event's alert messages, and within an event's workflow response actions.

To create a new calculated field, click on the "Add Calculated Column to Query" button. To add a calculation to a selected column, just click in that column and then click on the Edit button that appears there.

The Calculated Column Editor provides you with a list of some frequently-used arithmetic calculations at the top of the window; you may use any valid arithmetic symbols and functions (such as '+', '-', '/', and '*'), as well as any valid SQL functions that are approved for use with the database and ODBC driver you are using.

The editor also provides you with a list of all columns from your selected tables, as well as Perspective Workflow's complete list of date substitution variables. The "workbox" at the bottom of this window is where your calculation syntax is formatted.
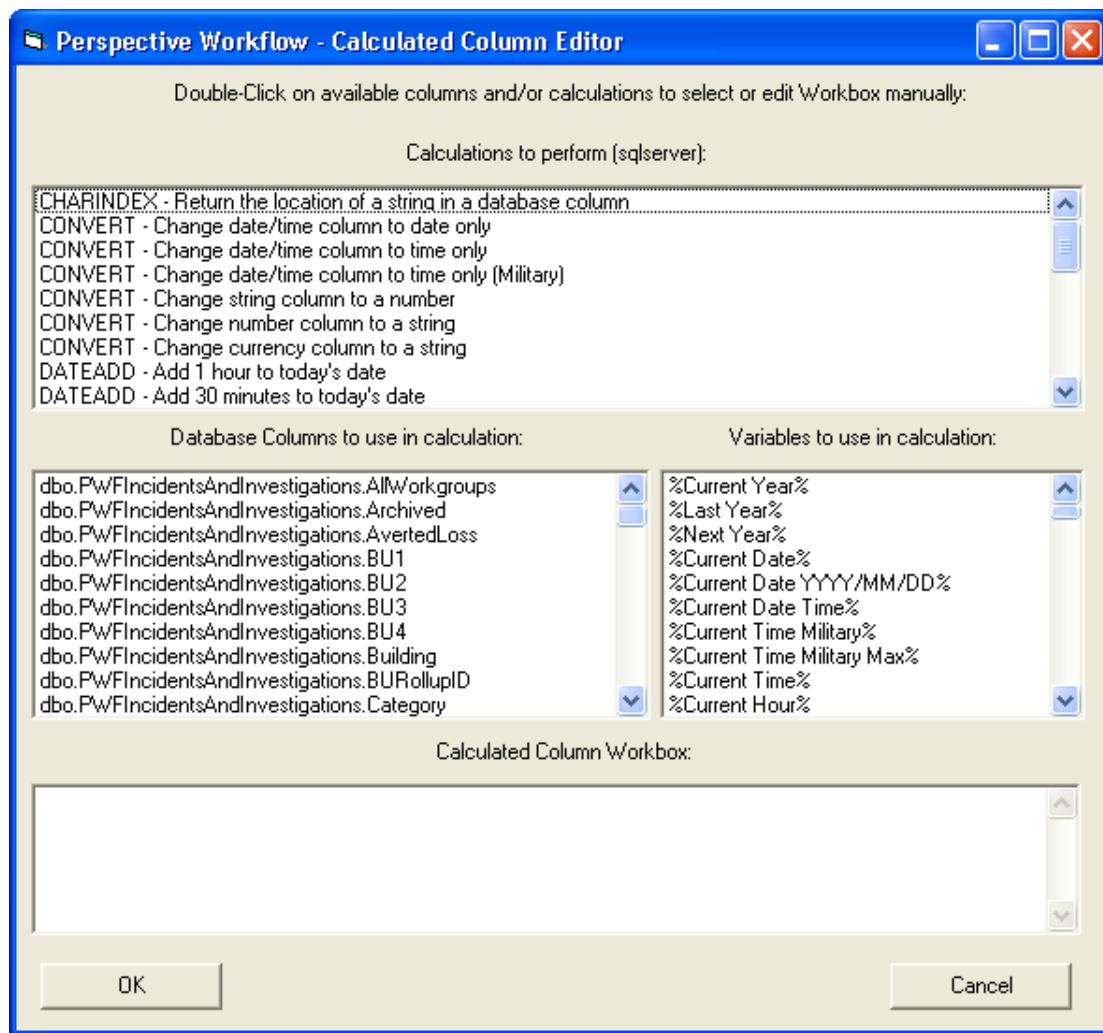
If you select any of the functions from the list of calculations, Perspective Workflow will automatically format that function for you, and all you need to do is select any remaining elements for that function.

Calculated Field Notes

- Use a query's "Preview" to ensure that your calculation syntax is acceptable to the database, the ODBC driver, and to Perspective Workflow.

- Be sure to modify the "Customized Name" of a calculated field.

- A single query can have multiple calculated fields within it.

- You can copy and paste the content of a calculated field by using CTRL/C to copy the contents and CTRL/V to paste them.

- Verify the format in which an application stores its "date" or "date/time" values. Even thought the values might (for example) be displayed as mm/dd/yyyy, your application might store them in a different format.

Date-Related Functions

Most databases (and drivers) allow you to calculate the difference between two dates. The syntax of these functions is dependent on the database (and driver) you are using.

Column Editing Options

Sending to Multiple Dynamic Addresses

Concatenation takes the values from two (or more) character fields and combine them so that their values reside in a single field.

A common use for concatenation is when you wish to send alerts to multiple addresses that are drawn from database values.

Be aware that only character fields can be concatenated; to concatenate date or numeric fields, you will need to convert them into a character format.

Trimming "Padded Spaces" from a Value

Sometimes fields contain "leading" or "following" spaces and you may not want Perspective Workflow to include these spaces when it retrieves the value.

Depending on the database being monitored, you can use the following functions. (The following are for SQL Server databases.)

- <u>rtrim</u>: Remove all following spaces from the right side of the field value.

- <u>ltrim</u>: Remove all leading spaces from the left side of the field value.

- <u>trim</u>: Remove all surrounding spaces from both sides of the field value.

The format for using these functions is: *trim(table.column)   (SQLServer)*.

<u>Retrieving 'x' Characters of a Value</u>

Sometimes you might not want to retrieve the entire contents of a field; you may (for example) wish to retrieve only the day of a person's birthday (as opposed to the day, month and year).

To do this, you would use the "substring" function as follows

Substring(table.column,starting position,length)

<u>Converting a Field's Type</u>

If you find the need to convert a field from one type (such as numeric) into another type (such as character), you would use the "convert" function as follows:
Convert(char(20),account.createdate,0)   (SQLServer). (This converts a date field into a string field.)

For an Oracle database, the command is: *TO_CHAR(TABLE.NUMBER,'9999999')*. (This turns a numeric field into a string.)

For a Pervasive SQL database, the command is: *convert(ARTRAN.OrderNumber,sql_char)*. (This turns a numeric field into a string.)

<u>Retrieving the "Top x" Number of Records</u>

Another useful function is the ability to retrieve only the top 'x' number of records that meet your criteria. The syntax for doing so (under SQL Server) is:

Top x table.column

Creating a Column that is a Label and a Field Value

In some cases, you may wish to create a column that contains both a field "label", as well as the field's value. This is useful if you have a field whose label you do not wish to appear in an alert message if the value of the field itself is blank (or null).

As you'll learn in the "Event Designing" chapter, you can also tell Perspective Workflow not to include (or allocate space to) any field whose value is null.

Note that you can only add labels to character-based fields.

Creating a Column that Contains a Dynamic Date Value

Perspective Workflow includes many date substitution values, such as "current date", "last Monday date", "next Friday date", and so on. To use one of these fields as a column within a query, format it as follows:

'{%Last Friday Date%}'

Retrieving Just the Month or Day from a Date Field

To retrieve just the month or day from a date field, use the following syntax:

month(hrpersnl.p_birth)
day(hrpersnl.p_birth)

Creating a Column that Contains a Hard-Coded Value

To create a column that contains a hard-coded value, such as a standard email address, as in smith@ppm2000.com, follow these steps:

1. Add any column to a query.

2. Click your mouse in the "Column Name Selected" field of the column you just added and delete the existing column name.

3. Type in a single quote ('), followed by the hard-coded value, followed by another single quote (as in 'smith@PPM 2000.com').

4. Go to the "Customized Name" and enter an appropriate name for this field.

<u>Creating a Column Pointing to a File Spec</u>

One of Perspective Workflow's special functions is to create a column that refers to the name and location of one or more files that you wish Perspective Workflow to deliver. Multiple files must be separated from each other with commas.

The file spec referred to within this column must either use the actual server, disk, and directory spec, or must use UNC format; do not refer to mapped drives.

When you add such a column to a query, the Customized Name of that column <u>must be</u> "attachment_files" (case sensitive).

When an event uses a query that contains such a column, you'll have the option to instruct Perspective Workflow to deliver the corresponding file(s) via email, Web, or FTP.

<u>"If – then – else" Logic</u>

To check the value of a field and then modify that value (or use a different value) is very useful. The SQL syntax for doing so is:

CASE table.column when 'value' then table.column+'value' else table.column END

If, for example, you have a column in a table that has values of I, C, or D and you want to display them as IN, CM, and DM in your alert message, you'd create three columns in your query as follows:

CASE table.column when 'I' then table.column+'N' else table.column END
CASE table.column when 'C' then table.column+'M' else table.column END
CASE table.column when 'D' then table.column+'M' else table.column END

Note that the preceding syntax is for SQL Server.

Removing Columns from a Query

To remove a column from a query, follow these steps:

1. In the Columns grid, point your cursor at the left-most column of the row that contains the field you wish to remove. The cursor will change into a right-pointing arrow.

2.   Click your left mouse button.

3.   Click on the "Remove Column from Query" button.

4.   You may use the Shift/Click function to select multiple columns, and you may use
     CTRL/Click to select "blocks" of records.

Return Distinct Rows of Data Only

"Returning distinct records only" (eliminating any duplicate records) is available via a checkbox at
the bottom of the Columns tab. "Return distinct" is based on the columns chosen for a query.

Sub-Queries (Embedded Selects)

One of the more advanced query design functions is the ability to create a column whose value is
the result of another query. This is referred to as "sub-queries" or "embedded selects".

Embedded selects require advanced SQL syntax knowledge, as each column name would be
edited to include a SQL select statement. Note that embedded selects must use the same ODBC
connection as the query in which they are embedded.

To create, view, or modify embedded selects, use the Calculated Column Editor, as it gives you a
full-screen editor in which to create your embedded select statement.

Sorting Order

When a query runs, it retrieves matching data records. You can specify the order in which these
records will be listed and processed. This is the query's "sorting order."

Any fields that were selected on the query's "Columns" tab are available for use in its sorting
order. To select your sorting order, follow these steps:

1.   Click on the "Sorting" tab. The following window will appear:
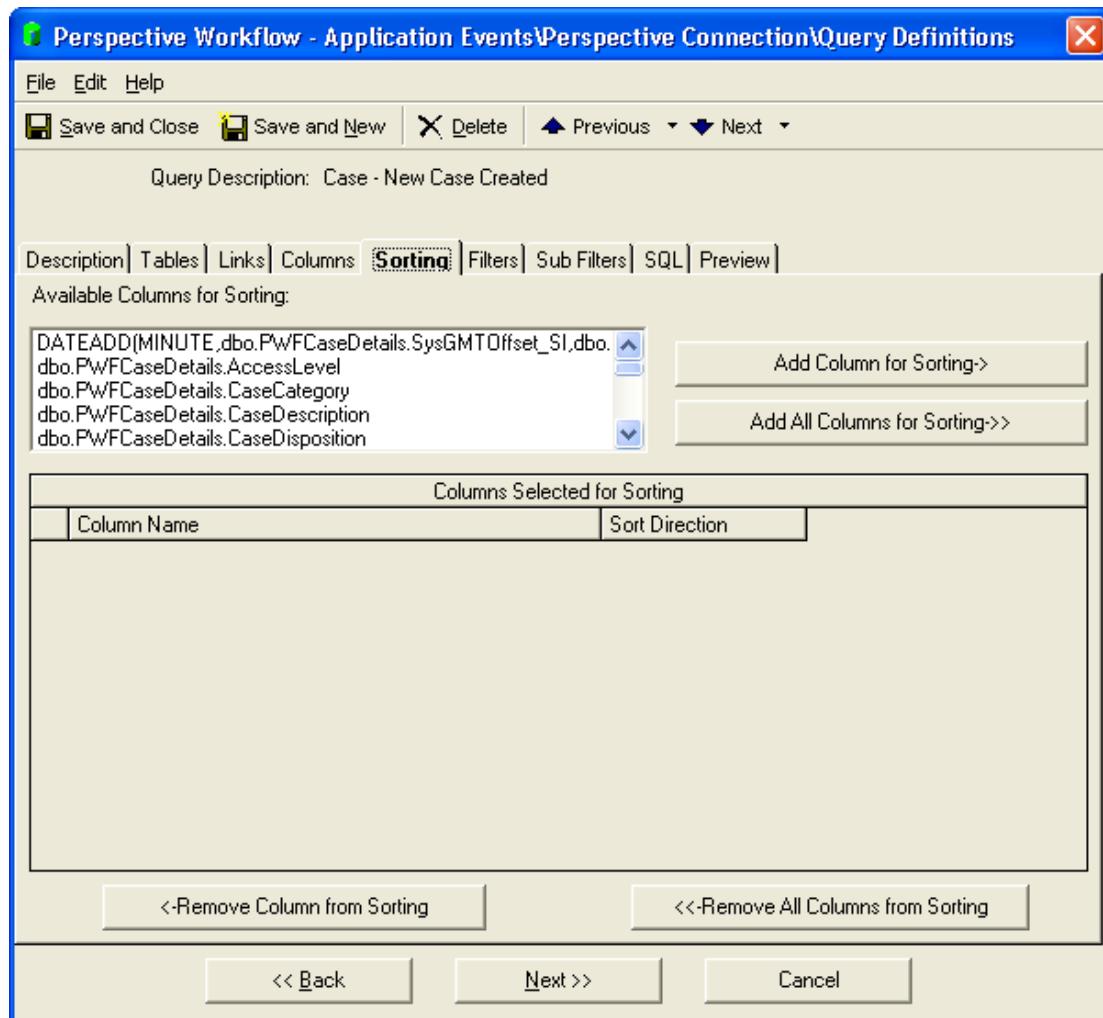
2.   Go to the list titled "Available Columns for Sorting".

3.   Double-click the field you wish to sort on.

4.   The "Sort Direction" field will default to "ascending" but may be changed to "descending" from the drop-down list.

5.   You can specify multiple levels of sorting. Once you have chosen your first sorting field, simply repeat the preceding three steps to create an additional level of sorting.

The Effect of Sorting on Record Breaks

When you configure a Perspective Workflow event to send alerts, you can have it send one alert message per "group" of triggered records.

To do this, you must tell Perspective Workflow how to <u>group</u> (or sort) the matching records so that all "similar" records are grouped together and can thus be put into a single alert message.

Filters

The most important part of query designing a query is the "conditions" that will cause the query to trigger an event. These conditions are referred to as "filters."

There are three general concepts of filter design. They are:

- What field values do you need to test?

- What "operator" will a filter use?

- What will the field value be compared against?

- Should a filter be parameter driven?

The following sections address each of these concepts.

Available Field Values

Filters can check the value of any fields within a database. They can identify newly-created records, records that meet specific criteria or thresholds, and can also check to see if the value of a field has changed.

Operators

A filter can use all standard operators, including:

- Equal to (priority is equal to "high").

- Not equal to (priority is not equal to blank).

- Greater than (amount is greater than 100).

- Less than (amount is less than 100).

- Greater than or equal to.

- Less than or equal to.

- Between (amount is between 100 and 200).

- Starting with (last name starts with "Smi").

- One of (priority is one of "Critical", "High", or "Medium").

A filter can also use one other operator:

- Value has <u>changed</u> since the last time Perspective Workflow checked it.

Compare Values

A filter can do much more than compare the value in one field against a value. Here are some of the kinds of tests that can be executed by a query filter:

- Test a field against a constant value
  (severity equals "High").

- Test a field against another field
  (direct loss is less than indirect loss).

- Test a calculated field against a constant value
  (assignment is due within 7 days).

- Test a calculated field against another calculated field
  (percentage of damaged items > percentage of undamaged items).

- Test a date or numeric field against a date or numeric range
  (due date is between this Monday and this Friday).

- Test a date field against a date variable
  (due date is equal to today).

Parameter-Driven Filters

Consider this scenario:

Your security director wishes to be alerted about incidents with net losses greater than $25k. Your CFO wants to know about incidents with net losses greater than $50k. And your CEO wants to know about incidents with net losses greater than $100k.

Do you need three different queries? The answer is <u>no</u>.

You can design one query called "<u>Net Loss > 'x' Dollars</u>.

This is a "parameter-driven" filter. Three different events can each use this same query but specify a different triggering threshold (net loss amount) on the event level.

Filter Components

When you click on the "Filters" tab you will see the following window:
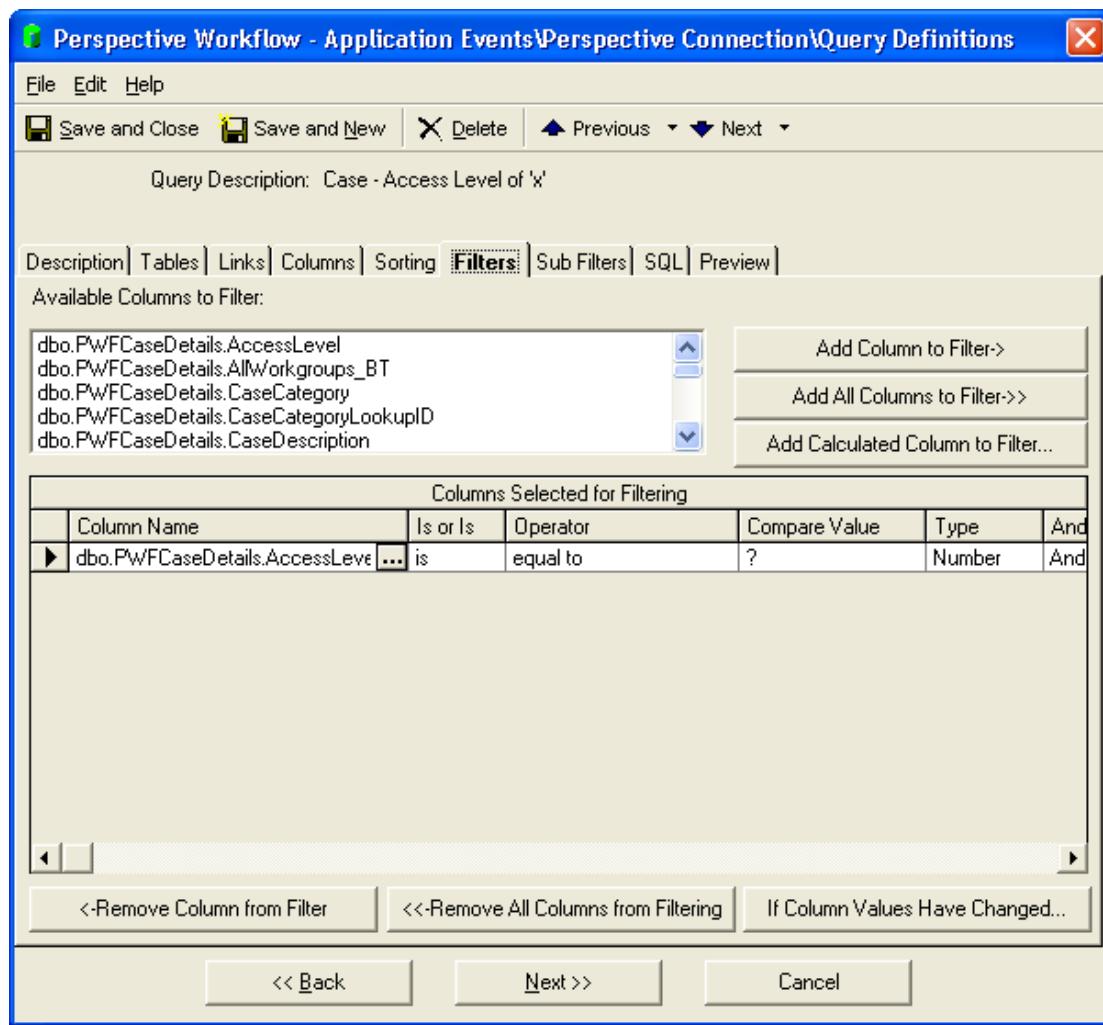
- <u>Column Name</u>: The name of the field you wish to filter on. Choose from the list of "Available Columns to Filter". To create a filter on a calculated column, click on the "Add Calculated Column to Filter" button.

- <u>"Is" or "Is Not"</u>: Defaults to "is". Click next to this word and choose "is not" if applicable.

- Operator: Defaults to "equal to". Click next to this word and choose any other operator if applicable. See "Operator Notes" for details.

- Compare Value: The value to compare the selected column's value against. This may contain a constant value, a value from another database field, a calculation, a date substitution, or a question mark. (See following section.)

- Type: The type of data the selected column contains. Leave with its default unless doing a date calculation (use 'number') or comparing against another database field or calculated value (use 'literal').

- "And / Or": The ability to specify "Boolean" logic (e.g., "look for condition 'a' or condition 'b'"). The default "and/or" logic is sequential and a filter's "and/or" applies to the current filter *in relation to the next filter*.

  Parenthetical or "grouped" and/or logic is supported. See "And/Or Logic".

- Optional Prompt: (Scroll right to see this field) The optional prompt is used only with parameter driven filters; see "Parameter-Driven Filters".

Comparing a Column Against a Constant Value

You can manually enter the compare value, or you can choose it from a drop-down list. To key it in manually, delete the question mark and type in your value. Perspective Workflow is case-sensitive. To select the value from a list, follow these steps:

1. Click in "Compare Value" and click on the list button that appears there.

2. Click on the list button under the heading "Type in a Value or Choose from dropdown List". This will display a list of possible entries for this field.

3. Choose the value that you wish to compare the column to and click OK. (Note: The dropdown list shows values that have appeared in this field in the underlying database. It does not display all possible values that *could appear* there.)

Comparing a Column Against Another Database Field

In this situation, the "Compare Value" contains the name of another database field.

1. In the "Compare Value" field, delete the '?'.

2. Type in the full name ("table.column") of the field you wish to compare the selected column to.

3. Go to the "Type" field and select "Literal".

Comparing a Column Against a Date or Numeric Range

One common request is to see if records fall within a date or numeric range. Although you can use the "between" operator, it is <u>not suggested</u>, as this operator tends to execute less efficiently than using a combination of "greater than or equal to" and "less than or equal to". Additionally, not all ODBC drivers support "between" and this operator cannot be used in parameter-driven filters.

To create a range filter, follow these steps:

1. Choose the field that you wish to filter on.

2. Choose the operator "greater than or equal to".

3. In "Compare Value", key in a "beginning" range (such as a "start date" or lowest allowable threshold). Enter a '?' to make this parameter-driven.

4. Make sure the "And/Or" option reads "And".

5. Add another filter on the same field.

6. Choose the operator "less than or equal to".

7. In "Compare Value", key in an "ending" range (such as an "end date" or highest allowable threshold). Enter a '?' to make this parameter-driven.

Comparing a Column Against a Date Substitution Variable

Many queries test the value of a date field against a value such as "today", "tomorrow", "last week", or "next month". Perspective Workflow provides a wide variety of "date substitution variables" that can be used as the "Compare Value".

To use a date substitution variable as a compare value, follow these steps:

1. Click in "Compare Value" and click on the list button that appears there.

2. Review the list of "Available Substitution Variables." There is a wide variety of variables to choose from. You will see multiple formats for the same value. The format without any suffix will use your system's date format.

3. Choose the value that you wish to compare the column to, click on the "Select this Item to Compare" button, and then click OK.

Be careful when using the "current date" variable if you are comparing a field that contains both the date and time to the "current date" variable. A field that contains today's date plus a time will automatically be greater than a field that contains just today's date.

You can address this either by configuring your filter to see if the date/time field is greater than or equal to today's date, or by configuring your filter to see if the date/time field is greater than "{%Current Date%} 00:01" and less than "{%Current Date%} 23:59".

Identifying New Records

You can configure a filter to retrieve records with a create date of "today", and since Perspective Workflow remembers what records have already been triggered, it will not notify you repeatedly about the same records.

But Perspective Workflow has a special date variable that makes this process more efficient; it's a variable called "Last Date/Time Event Checked". This variable allows a query to retrieve only records that have been added to your database since the last time Perspective Workflow ran the event.

This is particularly useful if your database is quite large or you are running an event very frequently (e.g., every hour).

Pervasive & Providex Date Formatting

PSQL and Providex databases typically store their dates in "YYYY-MM-DD" format. Thus to compare a date value from one of these databases to a date variable, you would typically use a variable such as:

{%Current Date YYYY-MM-DD%}

Parameter-Driven Filters

You can design a query to be used in multiple events using filter "parameters." A parameter, represented by the '?' symbol in the Compare Value field, indicates that the compare value will be

specified on the event level. This enables a single query to be used in multiple events, each event with a different parameter value.

Events using parameter-driven filters will require that a compare value be specified at the time that the event is configured. Once the event is configured, the parameter will have a specific value which is used every time that the event is executed.

The operators "one of", "between", and "null" may <u>not</u> be used with parameters.

To set up a filter to be parameter-driven, follow these steps:

1.   Make sure that a '?' appears in the "Compare Value" field.

2.   Move to the column in the grid, titled "Optional Prompt." The optional prompt is the text that will appear (on the event level) when this query is selected for use with an event.

      When such a query is selected for an event, the person configuring the event will receive the "optional prompt" informing them that they need to supply a compare value for this filter. The text of this prompt is defined here.

3.   Delete the default optional prompt text and key in your own text.

Checking a Column Against a Changed Value

When a "data change" event is first run, Perspective Workflow stores the current value of the field(s) you wish to monitor for a change.

The next time the event runs, it compares the "current value" of the field(s) to the "old values" from the previous check. If the two values are different, the event is triggered. And Perspective Workflow replaces the "old value" that it had stored with the "new current value". And so the cycle begins again.

Note the following about using "Change-Based" queries:

- A query may check for changes to any fields within the query's primary database table. The primary table is the first table listed in the "Links" tab.

- A query <u>must</u> have a unique column, its unique column cannot be a calculated or otherwise edited field, and the unique column's "Customized Name" must <u>not</u> be changed from its default value.

- If the database you are monitoring already supports "auditing", build queries to monitor that database's audit table rather than using changed-based queries. This is more efficient, and will eliminate audit data redundancy.

- If the database you are monitoring can execute stored procedures when a field is changed, it may be more efficient to use this function to populate an audit table which Perspective Workflow can then monitor.

- If you have multiple events checking for a change in the same field, these events <u>must</u> be scheduled to run at the same time (e.g., daily at 9:00 AM).

- A query can check to see if a field value <u>has changed</u>, or if it <u>has changed to a specific value</u>.

- If you select multiple "change" fields for a query, Perspective Workflow assumes an "OR" relationship between them.

- If a query includes "change-based" filters and standard filters, Perspective Workflow assumes an "AND" relationship between them.

- Any events using a change-based query <u>must</u> have the "repeat" function ("Repeat Notification for Triggered Items") turned <u>on</u>.

- When you <u>Preview</u> a query, the "change" logic is ignored.

- If a query uses "If Column Value Has Changed", the corresponding button at the bottom of the Filters tab will appear <u>underlined</u>.

<u>Selecting a Changed Field</u>

To create a filter that checks to see if a value has changed, go to the Filters tab and click on "If Column Values Have Changed". You'll see the following:
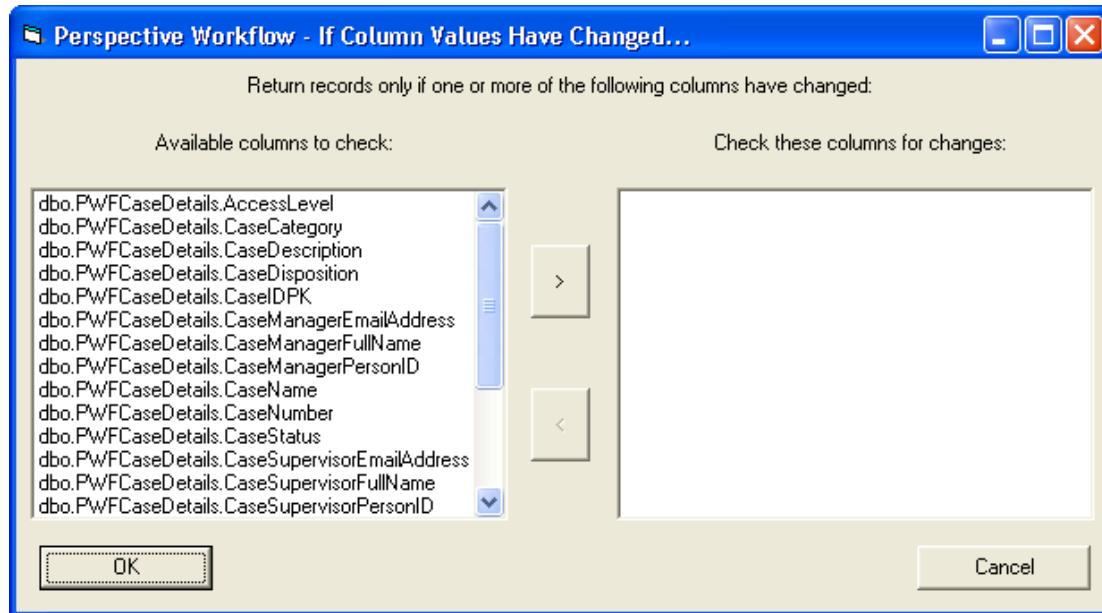
Only the columns from the query's primary database table are displayed. To select a field(s), highlight the field from the column on the left and click on the right-arrow button to move it to the column on the right.

Once you are done selecting "change" fields, click OK.

You may add additional filters, including a filter on the current value of your "change field" to check for records whose content has changed to a specific value.

Storing & Reporting On Changed Values

To store the history of when a "changed value" event has been triggered, it is suggested that you use the "Create File" action to create an audit trail. This lets you store the details of what records were changed, when they were changed, and what the old and new values for the change are.

Operator Notes

Of Perspective Workflow's 10 operators, five require a few additional notes.

Operator: "One Of"

The "one of" operator lets you test a column for any one of multiple values. "One of" tends to be most useful in "and/or" situations.

To use the "one of" operator:

1. Select "one of" from the operator list.

2. Click in the "Compare Value" field and click on the list button.

3. Remove the '?' as a compare value.

4. Either type in the individual compare values (pressing 'Enter' after each entry), or choose the compare values from the drop-down list.

5. Click OK when complete.

The "one of" operator may not be parameter-driven.

Operator: "Between"

PPM 2000 suggests that you use the combination of the "greater than or equal to" and "less than or equal to" operators in place of the "between" operator wherever possible.

The "between" operator may <u>not</u> be parameter-driven.

Operator: "Starting With"

The "starting with" operator lets you locate any database records that have a field whose value <u>starts with</u> a certain string of letters, numbers, and/or symbols.

To use the "starting with" operator, follow these steps:

1. Select "starting with" from the operator list.

2. Click in the "Compare Value" field and type in the first few characters of the string that you wish to use for matching purposes.

The "starting with" operator may be parameter-driven.

Operator: "Like"

"Like" is similar to "starting with" except that it lets you locate records that have a field whose value <u>contains</u> a certain string of letters, numbers, and/or symbols.

"*Starting with 'brit*'" will retrieve "Britain" and "Britannia" but not "New Britain".
"*Like 'brit*'" will retrieve all three values.

To use the "like" operator, follow these steps:

1. Select "like" from the operator list.

2. Enclose the text you are searching for within percent signs, as in "%brit%".

The "like" operator may be parameter-driven.

Operator: "Null"

You might find the need to check to see if a field's value is blank. But remember that a blank value in a database field can be either blank or null.

To test a field for a blank value, leave the compare value field blank. To test a field for a null value, follow these steps:

1. Select "null" from the operator list.

2. Blank out any value in the compare value field.

If you are not sure how an application identifies an "empty" field, you might want to create a query with two filters – one that tests for blank, and one that tests for "null".

Using Calculated Fields in Filters

To create a filter that tests the value of a calculated field, click on "Add Calculated Column to Filter".

Calculated fields can be used in both the column name field and in the compare value field. Calculated fields may also be parameter-driven.

You can access the Calculated Column Editor for an existing filter by clicking in the "Column Name" field and clicking on the Edit Button that appears there.

And/Or ("Boolean") Logic

Some "and/or" logic requires the ability to group filters together, using parenthetical expressions.

If the last filter in a group is testing the value of a character or date field, you must enclose the compare value in single quotes and change the data type to "Literal."

Sub-Filters

Sub-filters are not used with record-level or data-change queries; they are used only with aggregate queries and will be discussed in the section on aggregates.

Query SQL

PPM 2000 Technical Support does not support manually-edited SQL.

The "SQL" tab lets you review the SQL syntax that a query is executing. There is rarely (if ever) the need to make direct changes to a query's SQL. Once you start manually editing query SQL, all subsequent changes to the query must be done through the SQL tab.

If you wish to manually edit the SQL, place a checkmark in "I would like to manually edit the SQL for this query" box. It is essential that you select all needed columns for a query and identify the query's unique column before you edit the SQL.
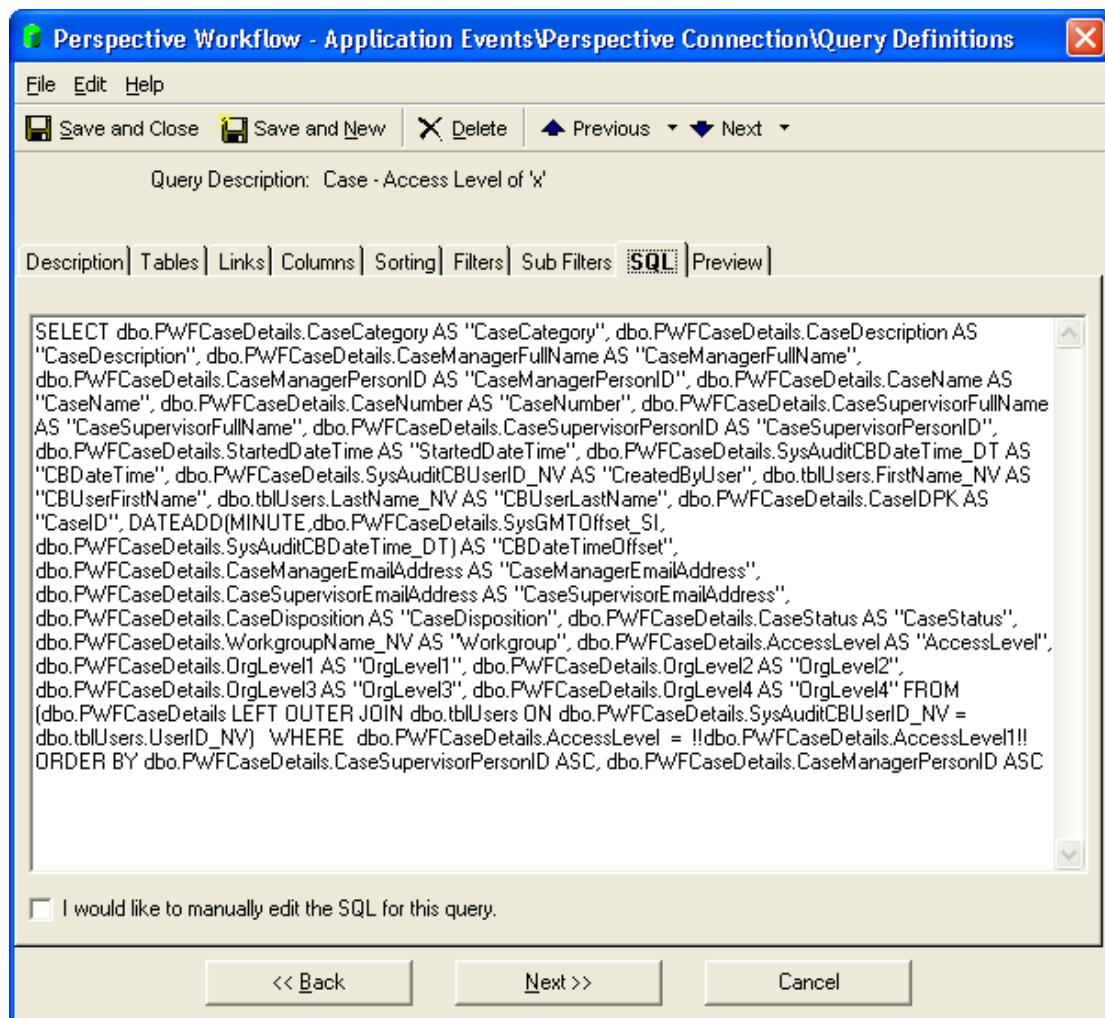
Once you manually edit the SQL syntax, any modifications that you make to any of the other query definitions tabs will <u>not</u> be retained.

If you edit a query's SQL and then de-select the manual editing option, the query will re-constitute the SQL syntax based on the content from the other query tabs.

Using a Stored Procedure in a Query

To use a stored procedure instead of a Perspective Workflow query, follow these steps:

1. Place a checkmark in the "I would like to manually edit the SQL for this query" box.

2. Type in the procedure name, as in "dbo.myprocedurename".

3. To pass parameters into your procedure, use the following syntax:

"dbo.myprocedurename param1,param2,param3"

(Parameters that are string values must be enclosed by apostrophe symbols.)

PPM 2000 Technical Support is not responsible for debugging problems in custom stored procedures used in this manner.

Preview

The Preview tab lets you verify that your query is running as you wish it to.

Hint: Don't wait until you have built every aspect of a query to preview it; use the preview function repeatedly as you add more and more elements to a query and begin to refine its criteria.

When you click on "Preview", Perspective Workflow will return any records that meet your query's criteria. If the preview tab is blank (containing no records), it means that no records met your criteria. When Preview mode returns matching records, it will appear similar to the following:
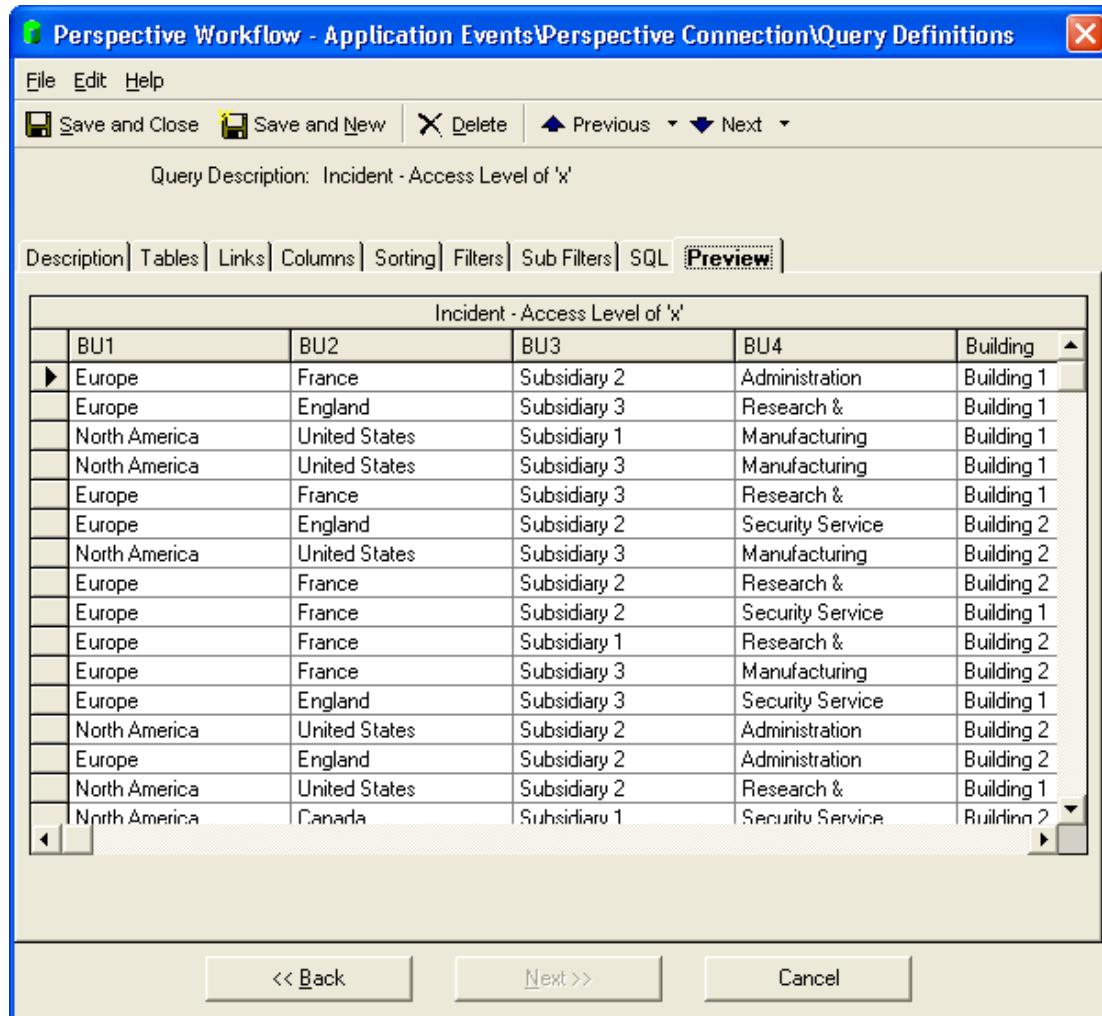
If you receive an error message when previewing, it means that Perspective Workflow was not able to successfully execute your query. The most common reasons for this are:

- The ODBC source for this application was not correctly configured.

- Multiple tables for this query were not correctly linked.

- Your query includes calculated fields that contain invalid SQL syntax.

- You have specified an invalid customized name for a query column.

- You have specified an invalid filter .

- You have edited the underlying SQL and introduced a syntax error.

- You have referenced a SQL function not supported by your ODBC driver.

If your query includes parameter-driven filters, you will be prompted to enter corresponding values; if the filter requires date values, you will be able to choose from Perspective Workflow's date substitution variables.

Saving a Query

To save your query, click the "Save and Close" button. To save a query and begin immediately working on a new query, click the "Save and New" button.

Copying a Query

To copy one query to another, follow these steps:

1. Open the Event Manager (not Navigator), expand the application that contains the query you wish to copy, locate the query and highlight it.

2. Go to the "Edit" menu and select "Copy."

3. Go to the "Edit" menu again and select "Paste."

4. A duplicate of the query will now appear in the query list. Go into either of the two (identical) queries and modify it as needed, and don't forget to change the query's description!

Deleting a Query

Before deleting a query, make sure that no events use it. If you delete a query that is linked to an event, the event will fail to execute successfully. To delete a query:

1. Open the Event Manager (not the Navigator), expand the application that contains the query you wish to delete, locate the query and highlight it.

2. Click the "Delete" button at the top of your window.

(You may also delete a query by going into the query you wish to delete and clicking on the "Delete" button at the top of your window.)

Note that there is no "Undo" option once you have deleted a query.

Scrolling Through Your List of Queries

In some instances, you might need to scroll sequentially through a list of queries. Once you have selected and worked with your first query, click on the "Previous" or "Next" buttons to view another query.

Aggregate Queries

Aggregate queries are queries that are triggered by a group of records that collectively meet a certain condition.

Aggregate queries do not retrieve "details" about individual records; instead, aggregates are triggered by the aggregate condition being met.

Aggregate queries can not use "change-based" filtering.

The Results of an Aggregate Query

The results of an aggregate query look different from the results of a record-level query because an aggregate query does not display record-level details.

Aggregate Query Configuration

Please read through record-level query designing before proceeding with the following sections. The instructions on aggregate query configuration assume that you are familiar with record-level query design.

Aggregate Query Naming

(See earlier "Query Naming" section.)

Aggregate Query Tables

(See earlier "Tables" section.)

Links

(See earlier "Links" section.)

Aggregate Query Columns

An aggregate query's columns are selected based on the following three criteria:

- The field that the aggregate function will be performed on.

- The "group by" field(s).

- Other fields to appear in the alert message, fields that contain an alert recipient's address, or fields that will be used in workflow.

Aggregate Functions

There are five aggregate functions:

- Summarize

- Average

- Count

- Maximum

- Minimum

Summarize

The "summarize" function lets you accumulate (or total) the amounts in a numeric field.

Average

The "average" function lets you derive the numeric average for a field.

Count

The "count" function lets you count the number of records that meet certain conditions.

Maximum & Minimum

The "maximum" and "minimum" functions let you identify the maximum or minimum values for a field.

Aggregate Grouping

When you consider an aggregate query, you need to consider not only what you want to perform the aggregate upon, but whether you wish to "group" the results of that aggregate.

The ability to create aggregates that group is one of the most powerful aspects of aggregate queries.

All aggregate functions support grouping, but grouping is most commonly used in "summarize", "average", and "count" aggregate queries.

How to Configure

To select columns for a "summarize", "average", or "min/max" query, follow these steps:

1. Go to the list titled "Available Columns to Query".

2. Select the field you wish to perform the aggregate function upon. The aggregate column should <u>always</u> be the first column selected.

3. Click next to the word "Normal" in the Column Type field. Display the drop-down list and select "Summarize", "Average", "Maximum" or "Minimum".

4. Change the customized name to reflect that this field contains an aggregate total (e.g., "amount_total" or "amount_avg").

    Do **not** put the aggregate function name at the start of a customized name (e.g., "total_amount", "avg_amount") as many databases do not allow this.

5. Go back to the list of available columns and select your "group by" fields.

The "Count" Function

To create an aggregate "count" query, do the following:

1.   Choose the unique column for the table whose records you wish to count.

2.   Click next to the word "Normal" in the Column Type field and select "Count."

3.   Change the "Customized Name" as appropriate.

4.   Select your "group by" fields.

Additional Column Selections

Here are a few hints for choosing additional columns in your aggregate query:

•   Make your "group by" field as informative as possible.

•   To _send_ the results of a query to the individuals that are identified _within_ the query, include the column that contains the delivery address that the alert will be sent to (e.g., the case supervisor's email address).

•   A query can have multiple aggregate fields.

The Unique Field

The Unique field does not apply to aggregate queries; you may skip specifying a unique column for an aggregate query.

Aggregates and Calculated Fields

Calculated fields may be used with aggregate queries in the same manner that they are used with record-level queries.

Sorting

(See earlier "Sorting" section.)

Filters

Aggregate queries use filters to determine which records are to be included in the aggregate calculation. Filters for aggregate queries are handled in the same manner as filters for record-level queries.

Aggregate queries cannot use the "If Column Values Have Changed" function.

Sub-Filters

In an aggregate query, a sub-filter is what lets you perform a test on the aggregate result. The following queries have their sub-filters highlighted:

- Incidents with *less than $10,000* in net loss per site.

- *More than 10* incomplete assignments per officer.

Sub-filters are used only in aggregate queries and are configured as follows:

- Click on the "Sub-Filters" tab.

- Column Name: From the list of "Available Columns to Filter" select the aggregate column you created earlier.

- "Is" or "Is Not": Defaults to "is"; click and choose "is not" to change.

- Operator: See "Operator Notes" earlier for details.

- Compare Value: Specify a constant value, a database field name, a date substitution value, or the question mark. (See earlier in chapter for details.)

- Type The type of data the aggregate column contains. Leave with its default unless comparing against another database field or calculated value (use 'literal').

- "And / Or": Since a query can include multiple sub-filters, this gives you the ability to specify "and/or" logic in the sequence of your sub-filters.

- Optional Prompt: Used only with a sub-filter that is parameter driven (has a '?' in the Compare Value field). See the chapter titled "Parameter-Driven Filters" for details.

Aggregate SQL

(See earlier "Query SQL" section.)

Preview (for Aggregate Queries)

Previewing an aggregate query is done in the same manner as for a record-level query.

Linked Queries

A single event can use multiple queries.

If the query result sets have no data in common with each other, you simply create each query independently and associate both queries with a single event.

(When multiple queries are associated with an event, Perspective Workflow automatically assumes an "and" correlation between them.)

However, if the query result sets do have data in common, the queries must be <u>linked</u> to each other. This requires additional query design considerations.

Note that data-change queries cannot be linked to any other queries.

How Queries are Linked

If you determine that you need two queries to identify whether a business condition exists, the first thing to decide is whether the queries will have some data in common with each other.

Here's how to "link" two queries with data in common:

1. Decide which query will go first and which will go second.

2. Design query #1.

3. Go to the "Columns" tab of query #1 and make sure that you include the linking field that is "in common" with query #2.

4. Modify the <u>Customized Name</u> of the linking field.

5. That is all you need to do on query #1. Move on to the next section.

Design the "Link to" Query

The second query should have a name that states that it is a "link to" query. Design this query as per its requirements and then (to create the link with query #1) follow these steps:

1. Go to the "Filters" tab of query #2.

2. Add a filter on the linking field.

3. Select an operator of "is equal to".

4. In the Compare Value field, key in (within curly braces) the customized name of the linking field from query #1.

5. That's all there is to it.

Query Linking Notes

Please make note of the following:

- A "link to" query will execute successfully <u>only</u> if it follows a preceding query containing the appropriate customized name. Do <u>not</u> use this query stand-alone in an event; it will not execute successfully.

- You can have up to 99 linked queries in a single event.

- A link-to query should not use a "group by" value.

- The link-to query cannot be used to retrieve "advanced" subscriber information. This information must be retrieved by the initial query.

- You can link queries from the same application or from different applications; the technique is the same (identify a "linking field").

Data Manipulation Between Linked Queries

One of the special benefits of linking queries is that it enables you to use data from query #1 in query #2.

When you link queries together, data from the first query can be used in the second query in the following places:

- In the "Columns" tab: You can create calculated columns in your second query that utilize data from the first query.

- In the "Filters" and "Sub-Filters" tabs: You can create filters and sub-filters in your second query in which the filter column or the filter "compare value" utilize data from the first query.

The only rule you need to obey is that in order to refer to a field from a previous query, it needs to be referred using its customized name enclosed with curly braces.

Note also that when an event uses multiple queries, all of the data fields (from all the queries) are available to be used in the event's alert messages, as report selection criteria, and is available to be used in the event's workflow.

Database Triggers

In addition to using queries to identify database conditions, Perspective Workflow supports the use of database triggers (which are embedded within external applications) as a means to know when records are added, changed, or (in particular) deleted.

Subscriber Maintenance

Event Subscribers

A subscriber is a person who is eligible to receive information and/or alerts from Perspective Workflow. Subscribers may receive notifications via email, fax, page, PDA, phone, Web browser, screen pop, and FTP (copied files).

Subscribers can be set-up within Perspective Workflow, they can be imported from external applications, or they can be linked from any external applications to Perspective Workflow.

Who Can Be a Subscriber?

Although alerts are most typically sent to internal employees, Perspective Workflow can send alerts beyond the borders of a single organization.

It is important as you configure Perspective Workflow subscribers that you consider the types of events that you will be configuring within Perspective Workflow and who the potential recipients of those events will include.

Designating a Computer as a Subscriber

In addition to setting up people as subscribers, Perspective Workflow also allows you to designate that computers as recipients of information when an event is triggered.

Using the FTP ("copy") delivery method, you can instruct Perspective Workflow to move certain files and/or reports to specific disk and directory specifications on one or more computers when an event is triggered.

How Are Subscribers Categorized?

You may wish to categorize subscribers according to similar areas of work. This is done through "subscriber groups." For example, you might create such groups as:

- Physical Security

- Surveillance

- Health & Safety

- Senior Management

There is no limit to the number of subscriber groups; so you create "nested" groups of subscribers such as:

- Physical Security

  - Site A Security

    - o Site A Supervisor

    - o Site A Officers

  - Site B Security

  - Site C Security

Using subscriber groups, you can configure an event to alert all the members of one or more groups. Note that a single event can send alerts to any combination of individual subscribers and groups of subscribers.

Alert Methods & Addresses

Each subscriber can be configured to receive alerts via up to five different methods:

- Email

- Fax

- Pager

- FTP (called "Copy")

- Web Dashboard (called "Webcast")

(Alerts may also be sent via PDAs, cellular phones, and "screen pop".)

Each subscriber may have up to two (2) delivery addresses per delivery method.

The reason for the two addresses per method is to allow a subscriber to have different delivery addresses _based on the time of day and day of the week_.

For example, an employee named John Smith of "Acme Inc" may wish to receive email alerts at smith@acme.com if an alert happens between 8 AM and 5 PM on Monday through Friday, but he may wish to receive email alerts at jwsmith@hotmail.net if an alert happens outside of those days and hours.

Dashboard Alerts (Webcasting)

Dashboard alerts (or "Webcasting") is the ability to generate Web pages containing alert information. This component requires its own configuration and set-up and is detailed in a separate chapter.

Subscriber Entry Methods: Overview

There are three ways that subscribers can be configured:

- Manual entry

- Subscriber import

- Subscriber linking

If an organization already has subscriber data residing in one or more ODBC-compliant database tables, you can import that data into the subscriber database. Imported data typically includes a subscriber's name and "delivery addresses". Data cannot be imported from Outlook or Microsoft Active Directory®.

Subscriber "Linking" is similar to importing, except that instead of transferring the data from an external application into Perspective Workflow, "linking" allows Perspective Workflow to directly read subscriber details from a table in another database.

Subscriber linking ensures that Perspective Workflow always has the most up-to-date subscriber data.

Preparation

If you are entering some (or all) subscribers manually, gather the following information for each subscriber you wish to set up:

- Subscriber's name, company name, and title.

- Subscriber's primary and secondary email, fax, pager, and FTP addresses.

- The days of the week (and hours of the day) when the subscriber will receive alerts via their primary and secondary addresses.

If you are configuring subscriber records via Import/Link, to do the following:

- Make sure that the database that includes the subscriber data is defined as an "application" within Perspective Workflow.

- Identify the fields in the external table containing the subscriber's name, company, title, and primary and secondary email, fax, pager, FTP addresses.

- Identify the days of the week (and hours of the day) when the subscriber will receive alerts via their primary and secondary addresses.

Subscriber Maintenance

Log into the Navigator and expand the branch called "Subscribers" to display the list of pre-configured subscriber groups.
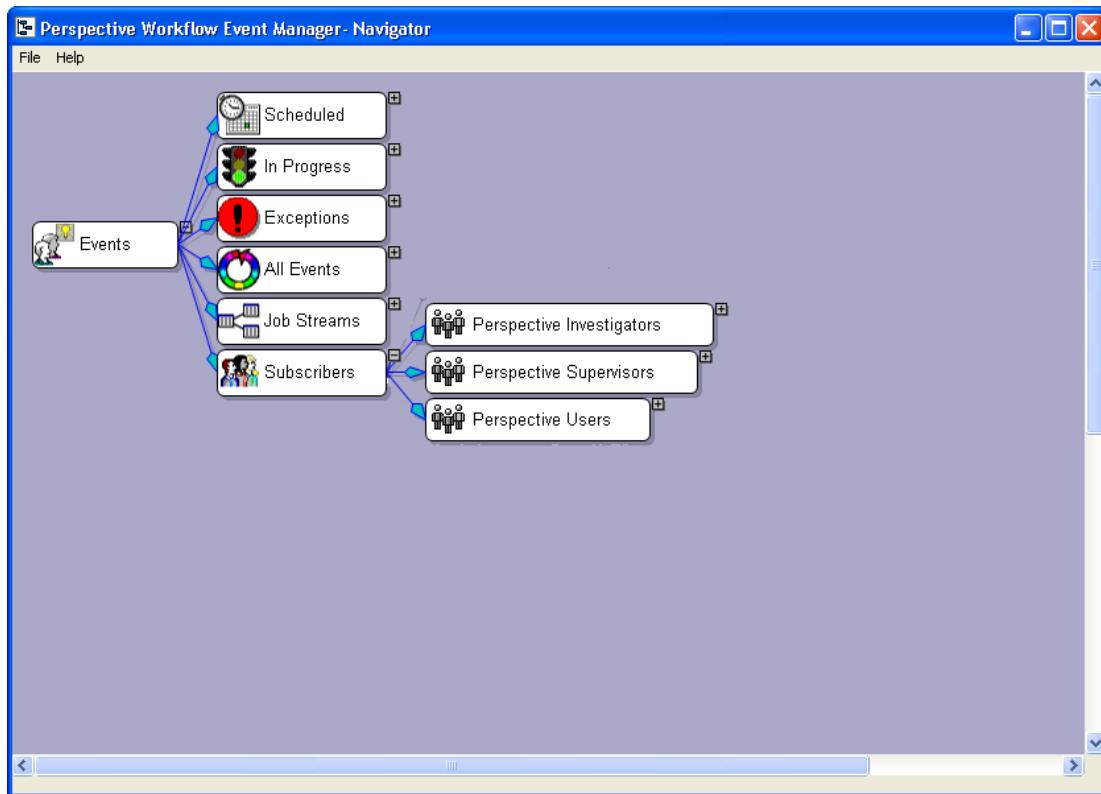
Group Maintenance

If you are importing and/or linking subscribers, please note that each "import" or "link" must be associated with a unique group.

To add a subscriber group, follow these steps:

1. Right-click on the "Subscribers" branch.

2. Select "New User Subscriber Group".

3. Key in a description of the new group you are creating and click on "OK".

Changing a Group's Name

To change the name of a subscriber group, follow these steps:

1. Display the subscriber group branch whose name you wish to change.

2. Right-click on that group and select "Properties".

3. Change the group's name and click on "OK".

Deleting a Group

Before deleting a group, make sure that no events are configured to send alerts to anyone within that group, or to the group as a whole.

To delete a subscriber group, follow these steps:

1. Open the Event Manager (not Navigator) module.

2. Single-click on the subscriber group branch which you wish to delete.

3. At the top of the Event Manager window, click on the "Delete" button.

Note that if a group is using subscriber linking, you must remove the link before you can delete the corresponding group.

Manually Entering Subscribers

To add a subscriber, follow these steps:

1. In the Navigator, expand the "Subscribers" branch and navigate to the group to which you wish to add the subscriber.

2. Right-click on that group and select "New User".

3. Fill in the user's name, company, title, and related info. If this user is able to be selected as an alert recipient, click on the "Active" checkbox. <u>Make sure that the "Full Name" has a value, as this is displayed elsewhere in the application.</u>

    If the subscriber is a computer, fill in the name, description, and IP address.

4. See the following section for details on the use of the "User Lookup Key" field.

5. Key in the address information (email, fax, pager, copy, and Webcast) for the subscriber. Note that if you enter a primary delivery address and press your tab key, the primary address will automatically be copied into the secondary address field.
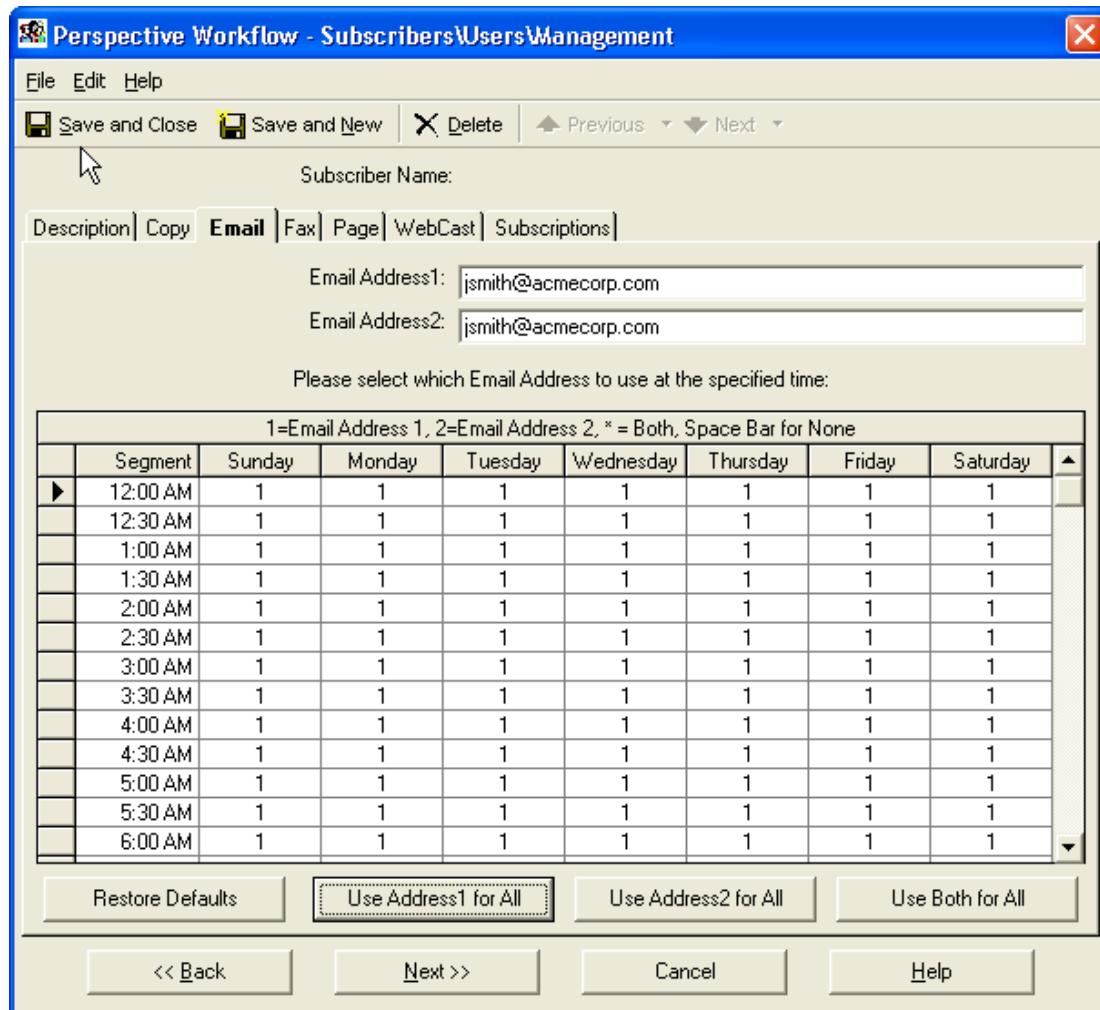
6. Note the grid in each of the "address" tabs; this is where you specify which address (primary, secondary, both, or none) will be used based upon the time of day and day of the week when an alert occurs. Notice that the grid scrolls down.

The grid is in 30 minute segments for each day of the week; within each segment you can specify whether you wish to use the primary delivery address ('1'), the secondary address ('2'), both addresses ('*'), or neither address (blank out the value).

7. Click the "Save and Close" button at the top-left of your window.

The "User Lookup Key" Field

The "User Lookup Key" can be used as a way to link a user's "ID" in an application with a specific subscriber record in Perspective Workflow.

Copy/FTP Notes

The "copy" method (FTP) method lets Perspective Workflow move files and Crystal Reports to specific locations (disks and directories).
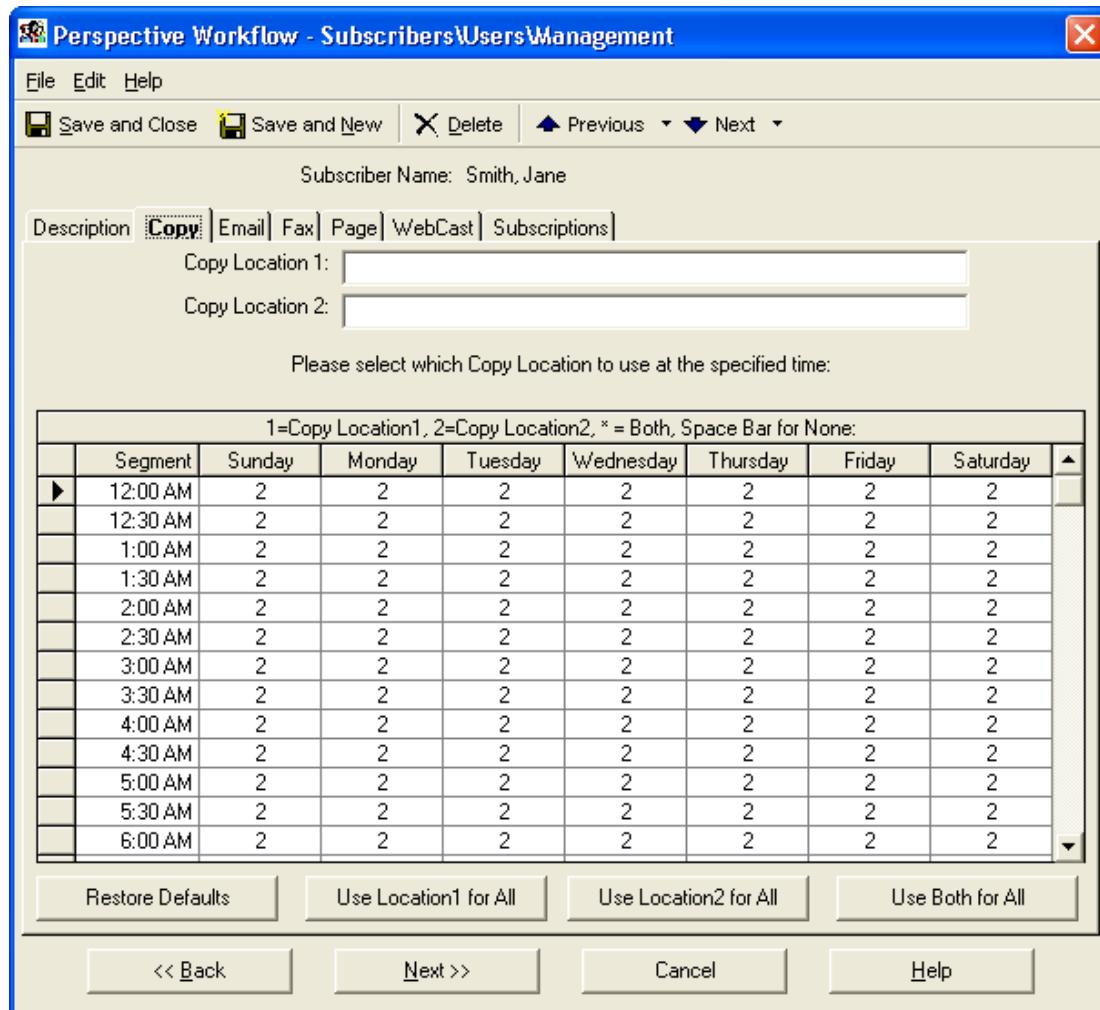
The copy location should be specified using standard UNC format (as in "//computername/sharename"). You may also specify an FTP address, using the format "ftp://username:password@ftp.location.net/directory_name". Do not reference any mapped drives in your location specifications.

Paging Notes

Perspective Workflow supports SMS paging.

Before you configure a subscriber to receive alerts via pager, configure Perspective Workflow's integration with the various paging services that your organization uses. This information is defined in the Administration module, under the option for "Software Setup → Paging Services."

Note that many paging vendors allow messages to be sent via email. Perspective Workflow supports both methods for sending alerts via pager.

Once you have defined your paging services, you may then configure a subscriber's paging record.
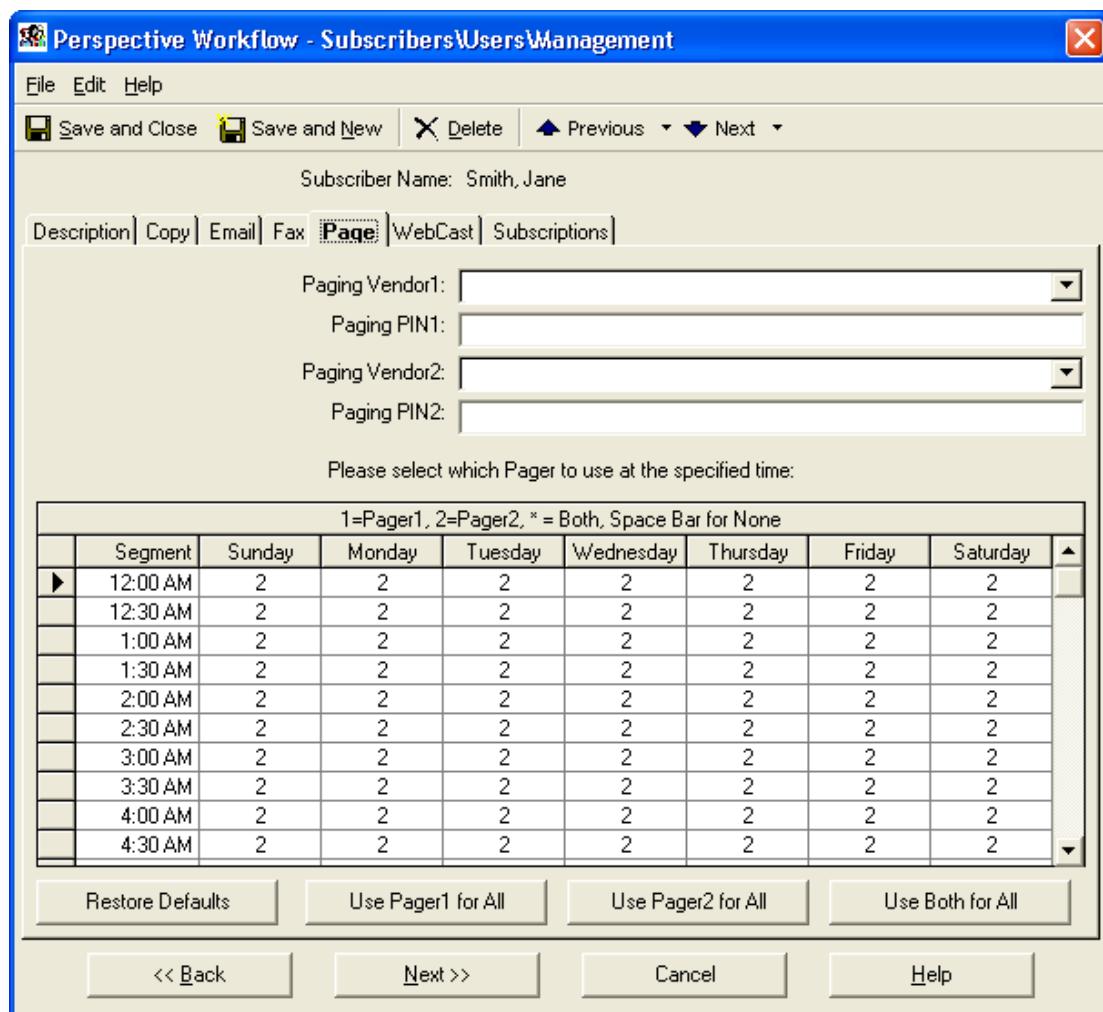
The "Subscriptions" Tab

The "Subscriptions" tab is n read-only listing of all the events that a subscriber is currently signed-up to receive alerts about.

Creating a Template Subscriber Record

When manually entering subscriber records, it is suggested that you create a subscriber template and then copy that template for each user you wish to add.

To create a template, simply add a new subscriber and give it a name such as "User Template." Modify the fields to reflect the common values that should be used in all new users, and then save that record.

The next time you need to create a new subscriber, simply copy that template instead of clicking on the "New User" button. (See "Copying Subscribers".)

Copying Subscribers

To copy a subscriber record, follow these steps:

1.   Open the Event Manager (not Navigator) module.

2.   Expand the group that contains the subscriber you wish to copy.

3.   Highlight (single-click on) the subscriber you wish to copy.

4.   Go to the "Edit" menu and select "Copy."

5.   Go to the "Edit" menu again and select "Paste."

6.   A duplicate of the subscriber will now appear. Go into either of the two subscribers and modify it as needed.

Deleting Subscribers

Before deleting a subscriber, make sure there are no events that send alerts to them. To delete a subscriber, select the subscriber you wish to delete and click the "Delete" button.

Note that there is no "Undo" option once you have deleted a subscriber.

Importing / Linking Subscribers

The configurations for importing or linking subscribers in Perspective Workflow are very similar; the only difference is that the import option transfers data from an external application into Perspective Workflow, and the link option creates a "live link" between subscriber data in an external application and Perspective Workflow.

If you have the option to choose one method versus the other, choose the "linking" option, as it is dynamic, and does not store the same data in two locations.

Create the Import/Link Query

In order to import/link subscriber data, you need to first create a Perspective Workflow query to retrieve that data. The data that you should retrieve (if available) includes:

- Subscriber full name, last name, and first name.

- Subscriber title, company name, and phone number.

- Subscriber's primary and secondary email address(es), fax number(s), preferred copy locations, and pager service TAP number and PIN.

Your query should be designed just like any normal, record-level query; typically it retrieves data from just one table that contains subscriber data. It may (or may not) include filters, and it must have a "unique" column identified.

Create the Import/Link Group

For each group of subscribers that you will be importing or linking to, you should create a subscriber group (e.g., "ERP Users").

Note that an import/link subscriber may also contain manually added subscribers.

Access the Import/Link Function

Follow these steps:

1. Locate the group that will contain the imported/linked subscribers.

2. Right-click on the group and select "Properties".

3.   Click on the "Subscriber Linking" button.

## Choose the Import/Link Query

1.   Click on the "Select Query" button.

2.   You are shown a list of applications in Perspective Workflow; choose the one that contains the query you designed earlier.

3.   Select the query you designed to retrieve subscriber data.

4.   The left side of the window displays the subscriber data fields. The right side lets you choose which fields will be mapped from the related query to fields within Perspective Workflow.

5.   Go to the row that contains the field you wish to map data to, click in "Linked to Database Field", and use the down-arrow to list the fields from the associated query. Choose the query field whose value you wish to map.

      Note that the Full Name field must have a value mapped to it.

6.   Click OK when done.

Note that the same query field may be mapped to multiple fields within the subscriber database.
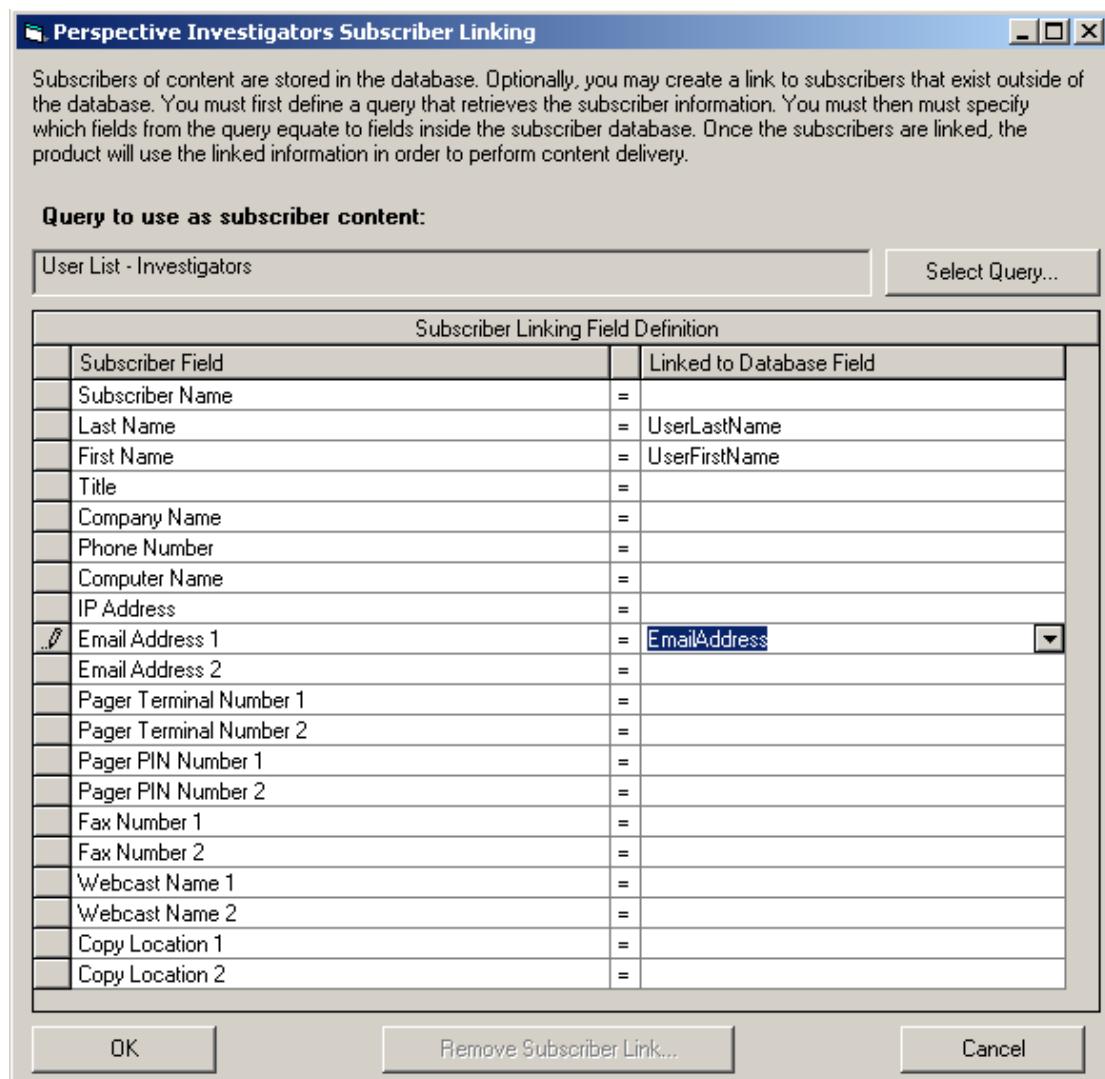
When you save this information, Perspective Workflow executes the import/link and retrieves the corresponding subscriber records from your external database. These records are displayed on the list on the right-side of your window.

Choose Link or Import

Once you finish mapping your fields and save your work, Perspective Workflow assumes that these subscribers will continue to be retrieved via a dynamic link.

This means that Perspective Workflow has not (as yet) imported this data, but rather is reading it dynamically out of an external database. You may leave this link intact or you may change it to an "import" where this subscriber data is actually written into the Perspective Workflow database.

Note that imported subscriber data may be maintained within Perspective Workflow; linked subscriber data may <u>not</u> be maintained within Perspective Workflow.

To change it into an import, take the following steps:

1. Locate the subscriber group for which you wish to disable linking.

2. Right-click on the group and select "Properties".

3. Click on the "Subscriber Linking" button.

4. Click on the "Remove Subscriber Link" button.
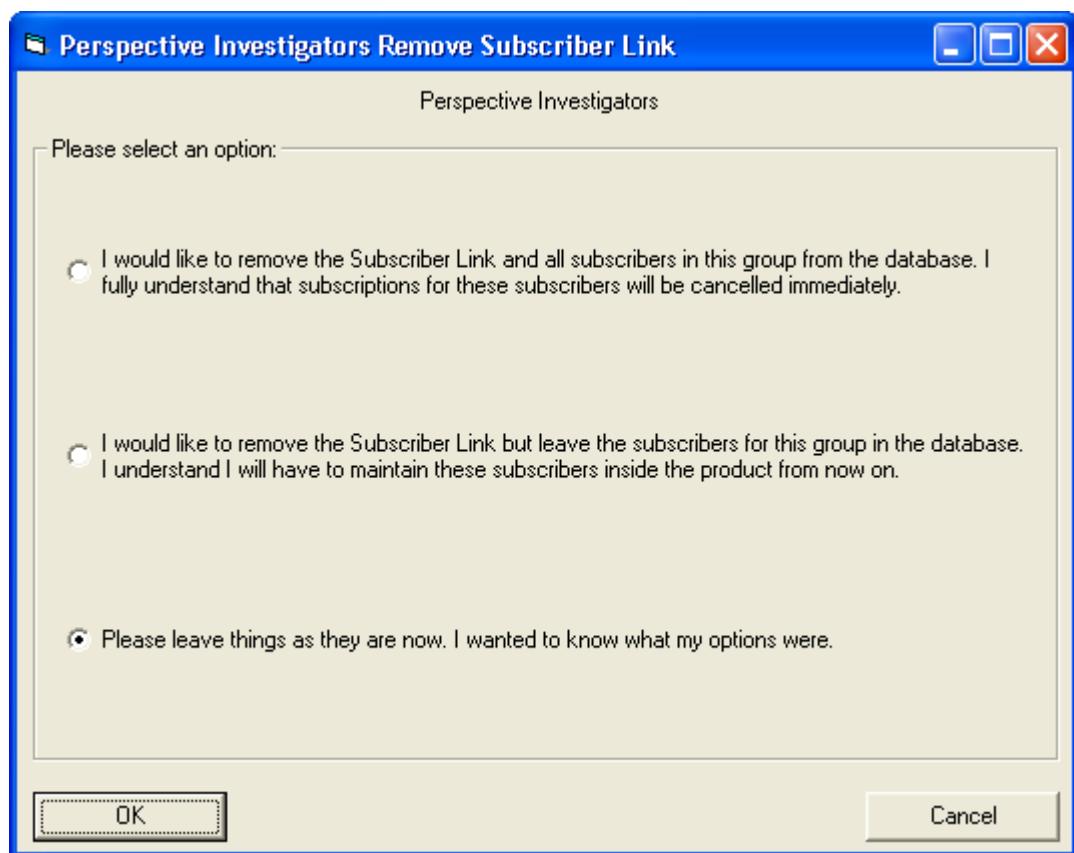
5. Click on the <u>second</u> option: "I would like to remove the subscriber link but leave the subscribers for this group in the Perspective Workflow database."

6. Click OK. The "link" will be removed and the subscriber data retained.

   Note that you must <u>save</u> your subscriber link before removing it.

Removing a Subscriber Link

When you remove a subscriber link, you may retain the details of individual subscribers, or you may remove both the link and subscriber details. To remove both the link and the related subscriber data, follow these steps:

1.   Right-click on the linked subscriber group and select "Properties".

2.   Click on the "Subscriber Linking" button.

3.   Click on the "Remove Subscriber Link" button.

4.   Click on the <u>first</u> option: "I would like to remove the subscriber link and all subscribers in this group from the Perspective Workflow database."

Editing Imported/Linked Subscribers

If you import subscribers (i.e., remove the link but retain the subscribers), you will be able to edit and modify those subscriber records. If you create a group of linked subscribers, however, only the grids of alert hours and days will be available for editing.

Intelligent Subscriber Groups

One of the benefits of creating subscriber groups using queries is that you can create "intelligent" groups of subscribers. For example: officers in the state of California.

"Intelligent" subscriber groups utilize queries that retrieve a specific sub-set of records.

Event Designing

An event checks to see if certain conditions exist and (if so), the event executes one or more "response actions", such as sending alerts, generating and delivering forms, documents, and reports, and executing application workflow.

What Triggers an Event?

An event can be triggered by:

- Conditions within an application database.

- The content of incoming email messages.

- Conditions within the operating system.

- A daily schedule.

- Database triggers.

The first two of these items utilize a Perspective Workflow query to determine if the corresponding conditions have been met; item #3 utilizes a Visual Basic script to determine the O/S conditions; item #4 utilizes a re-occurring schedule (and no other conditions); and item #5 uses "triggers" embedded within a database.

Event Queries

Queries enable an event to determine whether specific conditions have been met. Queries are used to identify conditions within application databases, or within incoming email messages.

A single event may use one or multiple queries.

A single query may be used in one or more events. Depending on how a query is designed, an event may be able to specify particular "trigger thresholds".

Event Alerts

Each event may have its own alert message content. An event's message content may include data from the corresponding conditions that have caused the event to trigger.

Perspective Workflow's alert delivery methods include:

- Email

- Fax

- Pager

- Web Browser (a.k.a "dashboard alerts)

- Screen Pop

- FTP

Event Files, Forms & Reports

As part of the message content, an event may generate and deliver forms and documents, the contents of files (such as Microsoft Excel® files), as well as the contents of one or more Crystal Reports.

Event Actions (Workflow)

An event can execute workflow to:

- Add or update application database records.

- Move data from one application to another.

- Trigger site-specific programs or procedures.

Event Subscribers

The recipients of an event's alerts are referred to as subscribers. Each event may send alerts to individuals, to groups of people, or to one or more computers.

Additionally, events may be configured to notify one or more people who are "related" to the triggering condition (e.g., notify the case supervisor to whom a case is assigned).

Event Schedule

An event's schedule determines how often you Perspective Workflow checks to see if the corresponding conditions have been met.

Each event has its own schedule; very time-sensitive events may have a very frequent schedule (e.g., every five minutes), whereas less critical events may be checked on a less frequent basis.

Checked Vs. Triggered

A "checked" event indicates that Perspective Workflow has successfully run the event. The conditions may have proven true, or they may not. An event that is "triggered" is one that has been checked and whose conditions have proven true.

Monitoring the Status of Events

The Perspective Workflow Monitor tracks the status of the event's execution:

- Events that are pending submission.

- Events that have been checked but not triggered.

- Events that have been triggered.

- Events with errors and have failed to run successfully.

If an event errors because of an error in its configuration, you can modify the event (or query) and Perspective Workflow will automatically re-run the event and use the modified version of it.

An Event without a Query

Consider the following scenarios:

- Every Monday at 8:55 AM you want to remind officers to attend the 9:00 AM team meeting.

- Daily at 5:00 PM you want to transfer an "assignments" file to a database server.

These scenarios are events without a query; they are simply scheduled to run on a re-occurring basis.

Before You Design Events

Make sure you have done the following:

- Reviewed query design.

- Added yourself as a subscriber.

- Defined your email sending account (in the Admin module).

Accessing Event Design

You can design events in either the Navigator or Event Manager modules.

When you log into the Navigator ("Admin"; no password), you can expand the branch titled "All Events" to see a listing of the applications that Perspective Workflow is currently configured to integrate with.

To see a listing of events for an application, expand that application and you will see a window such as the following:
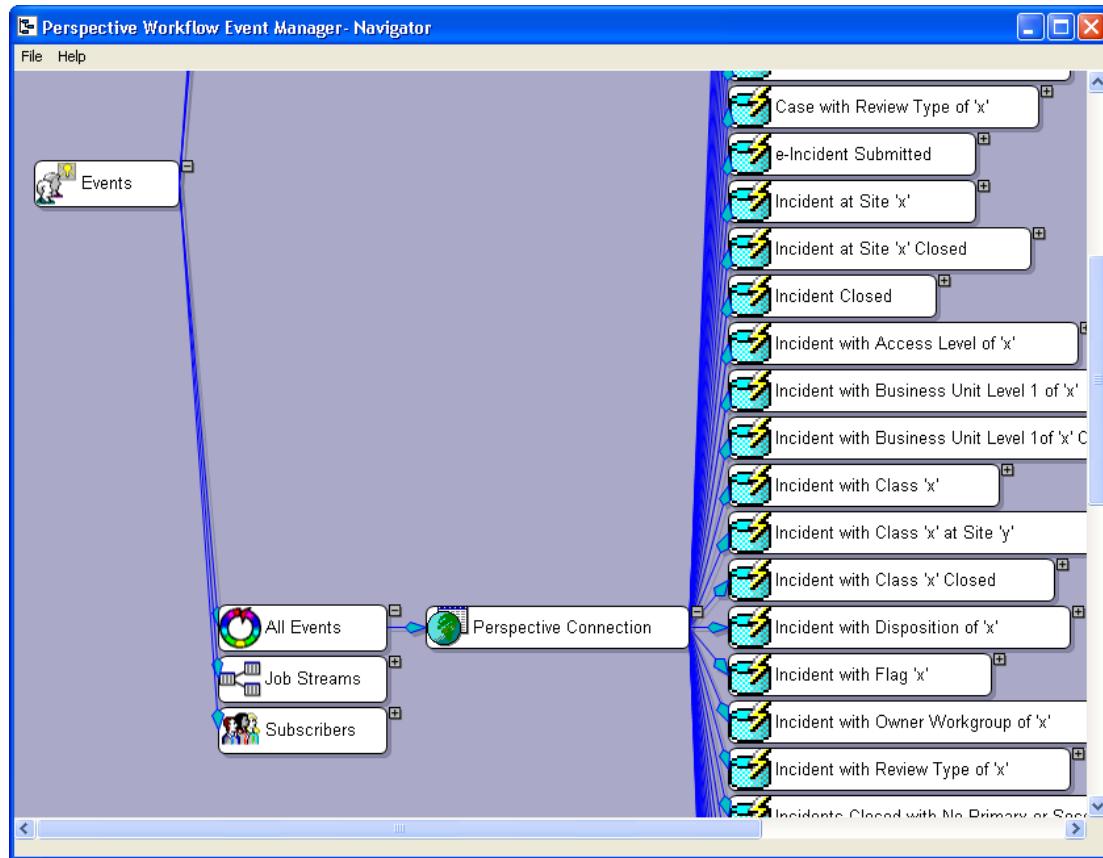
You may right-click on the "All Events" branch to show either "all" events or only those events that are currently "active".

View/Edit an Event

To view or modify an event, expand its components and right-click or double-click on the branch you are interested in.

Copy an Event

To copy an event, follow these steps:

1. Open the Event Manager (not Navigator), expand the application that contains the event you wish to copy, locate the event and highlight it.

2. Go to the "Edit" menu and select "Copy."

3.   Go to the "Edit" menu again and select "Paste."

4.   A duplicate of the event will now appear in the event list. Go into either of the two (identical) events and modify it as needed, and don't forget to change the event's description!

Create a New Event

To create a new event:

1.   Right-click on the application to which you wish to add an event.

2.   Choose "New Event".

3.   Go through the tabs in the Event Designer from left-to-right.

4.   When done, click "Save and Close" at the top-left of your window.

Description, Priority & Repeat Notifications

From the Navigator, double-click on the event name.
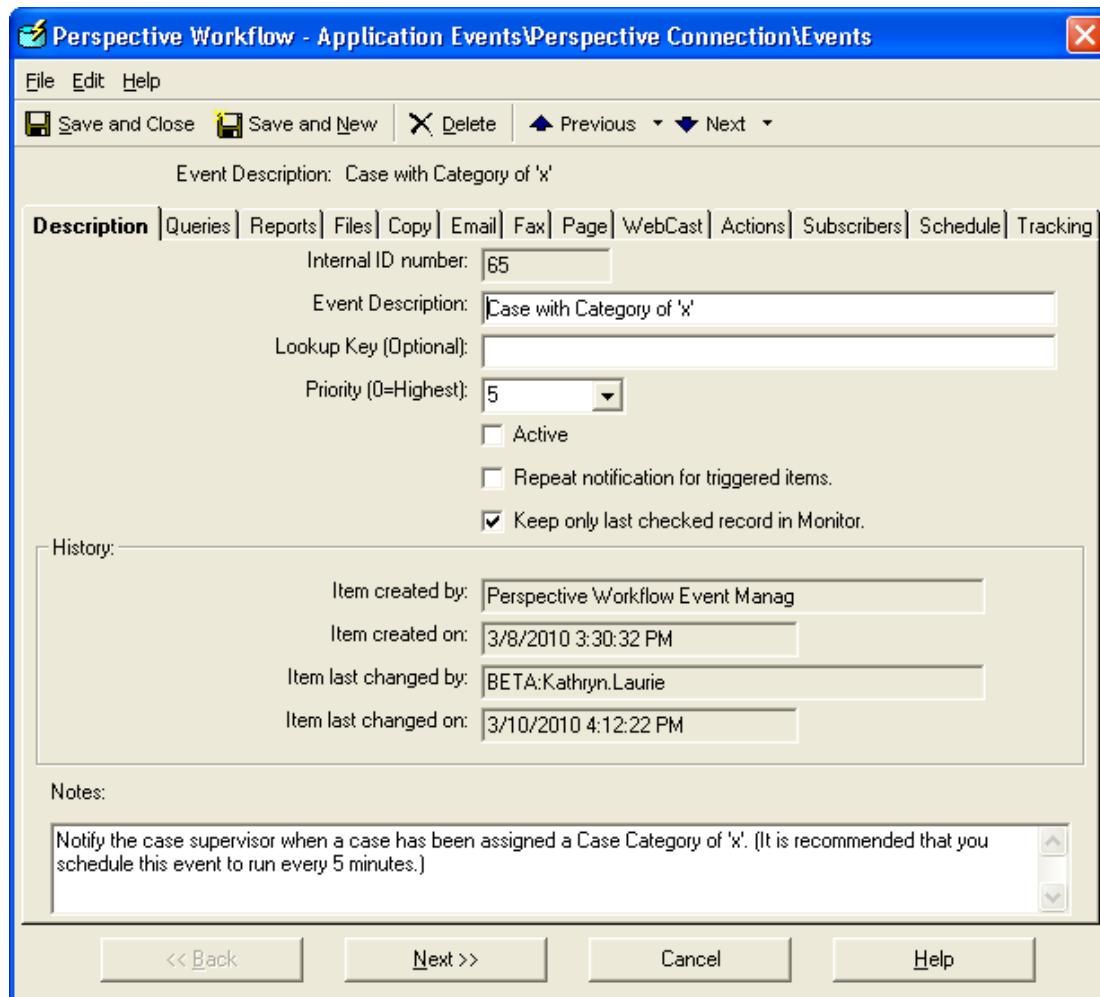
- Event Description: Use a standard naming convention, such as "Data Object; Condition", as in "Assignments; Overdue".

- Lookup Key: Leave blank, unless an event's execution is to be "called" from an external application.

- Priority: The order in which events with identical schedules (e.g., daily at 9 AM) will be submitted. Higher priorities ('0' being the highest) will be submitted first.

- Active: Whether an event is eligible to be scheduled (run) by Perspective Workflow.

Repeat Notification for Triggered Items

Events run on a re-occurring schedule (such as every hour); thus it is possible that a record that causes an event to trigger at 9 AM might still meet the criteria at 10 AM. You need to decide whether the record that triggered at 9 AM should again trigger it at 10 AM.

For some events, you might want a record to trigger the event repeatedly, as long as the record meets the event's criteria. For other events, you might want a record to trigger an event just once.

If you want an event to trigger once for a record meeting an event's criteria, do not place a checkmark in "Repeat notification for triggered items."

If you want an event to trigger repeatedly about a record until that record no longer meets the event's criteria, do place a checkmark in this field.

Enabling an Event to Not Repeat Notifications

To configure an event to not repeat notifications, the event's query must have a "unique" column identified.

If the query has no "unique" column, the event will be in "repeat" mode.

How Triggered Records Work

(If "repeat notifications" is not selected.)

When a record meets an event's criteria, that record is "triggered" and will show up in the "Tracking" tab of an event. If, the next time the event runs, the same record no longer meets the event's criteria, the triggered record will be removed.

You may manually clear a triggered record for an event using the "Tracking" tab.

Using Repeat in a Field-Level Change Event

If an event is checking for a "change" to the value of one or more database fields, the "Repeat notifications" field must be checked on.

Keep Only Last Checked Record in Monitor

Perspective Workflow keeps track of when an event was submitted, whether it was successfully executed, and whether the event was triggered.

In many cases, an event will check many times without being triggered. And the Perspective Workflow Monitor shows the history of every time an event was checked, regardless of whether the event was triggered or not. This can accumulate a lot of un-needed history in the Monitor.

To avoid retaining all this history, you can choose to keep the details of only the last time an event was checked. Note, however, that even if you do opt for this, the system will always store the details of every time an event was triggered.

The suggested setting for this field is checked on.

Queries

To view, modify or remove a query associated with an event, double-click on the Query branch. If a query has "event trigger parameters", they are indicated by a plus sign after the query name.

If an event has no query and you wish to add one, double-click on the event name and click on the "Queries" tab.

To view or modify the configuration of a query associated with an event, right-click on the query name and select "Edit Query". Refer to the chapter on Query Designing for details on query components and configuration.

When you display a query associated with an event, a window like this will appear:
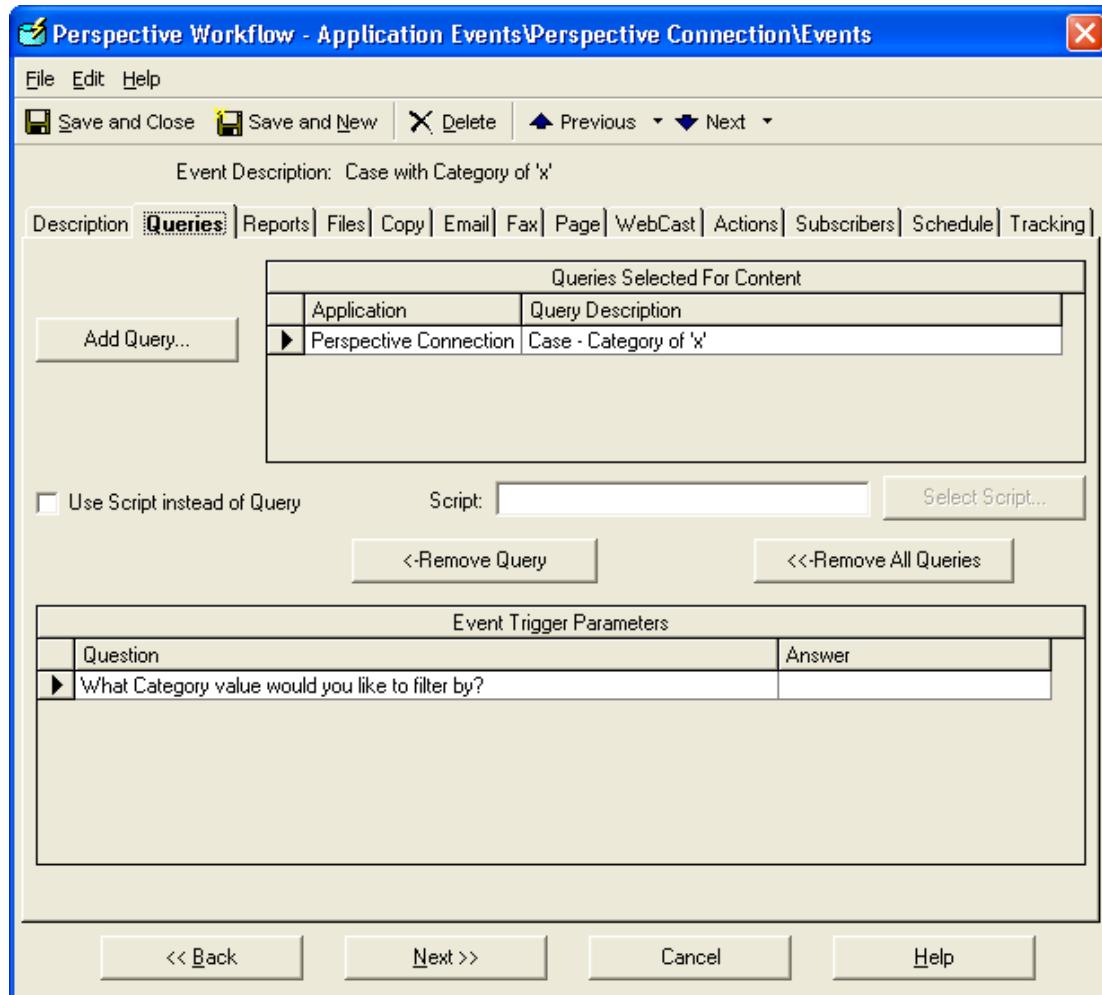
Adding/Removing an Event's Query

To add a query to an event, click on the "Add Query" button and you will be shown a list of all the queries for the current application. Select the query you wish to use, answer any Event Trigger Parameters, and click "Save and Close" to return to the Navigator window.

To add a query from another application to an event, click on the "Add Query" button and then on the "Select Another Application" button. Choose an application, select the appropriate query, answer any Event Trigger Parameters, and click on "Save and Close".

To remove a query from an event, click on the query you wish to remove and then click on the "Remove Query" button. Click on "Remove All Queries" to remove all queries associated with an event.

If you select multiple queries for an event, an "and" condition is automatically assumed between them. Note that an event that uses a query which looks for a change to a database value cannot use multiple queries.

Event Trigger Parameters

As detailed in Query Designing, a query may have filters that are "parameter-driven"; those whose "compare value" is specified on the event level.

Whenever an event uses a query that has parameter-driven filters, you will be prompted (at the bottom of the Queries tab) to specify the values for those filters.

These parameters cannot be left blank.

If an Event Trigger Parameter appears, the parameter will begin with a "Question" that instructs you on the type of answer required.

Parameter Answer

Most parameters can be answered by keying in (or selecting) a specific value. You can manually type in the value, or you can choose that value from a list. Perspective Workflow is case-sensitive, so a compare value of "high" will not retrieve those records that have a value of "High".

To select a value from a list, follow these steps:

1. Click in the "Answer" field and click on the list button appearing there.

2. Click on the list button under the heading "Type in a Value or Choose from dropdown List". This will display a list of entries for this field.

3. Choose the value and click on "OK".

    Note that the dropdown list shows values that have appeared in this field. This list does not display every possible value that *can appear* in this field.

Date Substitution Variables

To use a date substitution variable in answer to a trigger parameter:

1. Click in the "Answer" field and click on the list button there.

2.   Review the list of "Available Substitution Variables." The variables are available in multiple formats; variables without any format use your system's date format.

3.   Choose the value that you wish to use and then click OK.

4.   Once you select a variable as an answer, you can edit it to append specific values. For example, {%Current Date%} 23:59 means today at 11:59 PM.

Using a VB Script Instead of a Query

You may have data outside of ODBC-compliant databases that you would like to monitor. For example:

•   Low disk space, full mailboxes or application errors.

•   Files that have arrived or grown too large.

To check for such conditions, you will need to use a Visual Basic (VB) script instead of a query to determine whether the corresponding condition has occurred. This requires that you create the VB scripts that will be used; please see the chapter titled "Visual Basic Scripting" for details on the configuration of these scripts.

Once you have created a script for an event to use in this manner, follow these steps:

1.   Place a checkmark in the field called "Use Script instead of Query".

2.   Click on the "Select Script" button and choose the appropriate script.

An event cannot use a combination of scripts and queries.

Reports

Reports are associated with events for two reasons:

•   To generate a form that is to be delivered as part of the alert.

•   To trigger the generation of a report associated with the event being triggered.

To view, modify, or remove a report associated with an event, expand the Deliverables branch and then double-click on the Report branch. If a report has "parameters", they are indicated by a plus sign after the report name. (If an event has no reports and you wish to add one, double-click on the event name and click on the Reports tab.)

To view or modify the definition of a report associated with an event, right-click on the report name and select "Edit".

Please refer to the chapter titled "Event Triggered Reports" for details on this option.

Files

You may associate static files to an event, such as Microsoft Word or Microsoft Excel files. Associated files may be delivered via email, fax, FTP or Webcast. Typical uses of static attached files include:

- To send a "Policies and Procedures" document along with a message.

- To send an HTML newsletter to recipients.

- To send a Microsoft Excel spreadsheet to specific recipients.

To view, modify or remove a file associated with an event, expand the Deliverables branch and then double-click on the File branch. If an event has no files and you wish to add one, double-click on the event name and click on the Files tab.

Once on the Files tab, follow these steps:

1.   Click on the "Add File" button.

2.   Locate and select the file you wish to add.

3.   Enter a description of the file.

4.   Click on "Ascii Text" if the file is in ascii format. (Only ascii files may be faxed.)

File "Alternative Text" Option

(Available only if sending email via Internet/SMTP method.)

Perspective Workflow gives you an easy way to deliver HTML documents without having to manually enter their contents into the Email tab of an event. This uses the "alternative text" option from the Files tab.

By specifying a file that is in HTML format and then clicking on the List button in the Description field of an associated file, you can choose "alternative text/html". When you do so, the associated

file will appear within the body of the email message sent by an event. (The file will not be delivered as an attachment.)

If an event delivers content to some users whose mail system can display HTML and other users whose mail system cannot display HTML, you can both associate the HTML document as "alternative text" and also specify the same text (in ascii or plain text format) within the Email tab of an event.

Note that no query data fields may be included within the alternative HTML file and that you may also choose formats of "richtext" and "enriched" (and may in fact have multiple alternative files of various formats).

Copy (FTP)

If an event has associated reports or files, you may deliver these files to their intended location via FTP, referred to in Perspective Workflow as the "copy" method.

To specify whether an event will copy its reports or files to a desired location, expand the Deliverables branch, double-click on either a Report or File branch, and then click on the Copy tab.

Note that the Copy tab lets you specify whether the reports and files associated with an event will be <u>eligible</u> to be delivered via FTP. You will still need to specify (on the "Subscribers" tab) which recipients will receive the related reports/files.

If an event's query includes the column called "attachment_files", those files will be delivered along with any other reports/files.

To specify that an event's reports and/or files will be eligible to be copied to a desired location, click on either (or both) of the checkboxes on this tab.
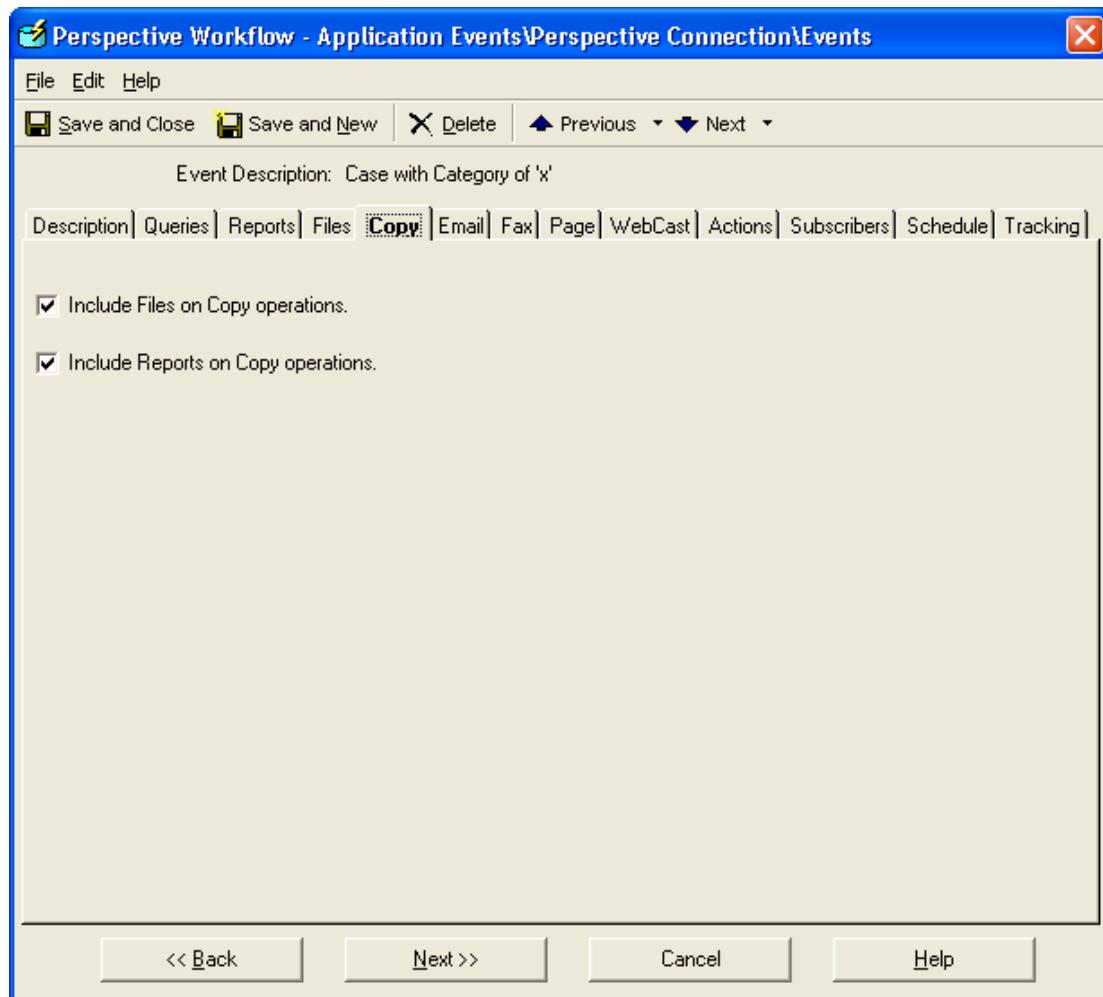
Perspective Workflow's Copy server must be enabled to process if you are using this option. To view the status of (or start) the Copy server, do the following:

1.   Log into the Perspective Workflow Administrator.

2.   Click on the Activity folder and then on Server Status.

3.   If the Copy server is not running, double-click on it and place a checkmark in the field called "Allow Server to Process."

4.   Click "Save and Close".

Monitoring the Status of Copied Files

To track the status of copied files, open the Monitor module and click on the File Delivery branch. You can then see what files are waiting to be copied (pending), have been copied (Sent), or have encountered problems (errors).

You may use the "Corrective Actions" option in the Administrator to address "File Delivery Errors". The system will re-try file delivery failures every minute.

Transferring Files to an AS/400

To transfer files to an AS/400 machine, make sure that the following are all true:

- On the AS/400, verify that you have a userid and a password that are the same as the account running the Perspective Workflow Service.

- On the AS/400, verify that the userid has "objauth" to the Library or IFS Directory you are transferring the files to. (Run "dspobjaut" to verify.)

Alert Message Design

The method by which you design alert messages is identical regardless of the type of alert (email, fax, etc.) that you are sending. Thus all design options are detailed in the "Email" topic in this chapter; the other delivery methods will address only the unique aspects of each.

Email Message

To view or modify the email alert message associated with an event, expand the Deliverables branch and then double-click on the Email branch. If an event has no email alert message and you wish to add it, double-click on the event name and click on the Email tab.

Once on the Email tab, you will see the following:

- Available Values for Use in Message Content: This is a list of all the fields from the event's queries. These fields may be used anywhere in your alert message.

  Also in this list are date variables (such as "today" and "tomorrow"), as well as some special formatting controls at the end of the list (detailed later on).

- Email Account to Send From: This refers to the email account (configured in the Administrator) that Perspective Workflow will send the email alerts from. Click on the list button and choose a corresponding account. An event will not be able to send an email alert if this field is left blank.

- <u>Email Reply Address</u>: (Usable only if sending email via an Internet/SMTP method.) You have three choices for this field:

  - Leave blank. The default "from" and "reply" name configured in the setup of the email sending account will be used.

  - Hard-code, e. g., Supervisor Name <firstname.lastname@yourcompany.com>.

 - Use a database value. To do this, the value must be selected in the event's query.

    The address used <u>must</u> be a valid email address. If not, the corresponding email alert will fail to be sent.

- <u>Message Subject</u>: Enter the subject of the outgoing alert message. You can use any "available values" in the subject field (position your cursor in the subject and then double-click on the value you wish to appear there). This includes date variables.

- <u>Message Text</u>: Enter the content of the alert message; typically a combination of hard-coded text and field values. The message text may be formatted in either plain text or HTML, and there is a limit of 32k for the size of the message text.

  You may select database fields for your message by positioning your cursor where you want the field to appear and double-clicking on the field from the list of "Available values". (You may also highlight the field and click on "Use selected value in Text".)

Note: To minimize message delivery issues, ensure that your email alert messages comply with anti-spam software rules.

A completed email alert message configuration will look similar to the following:
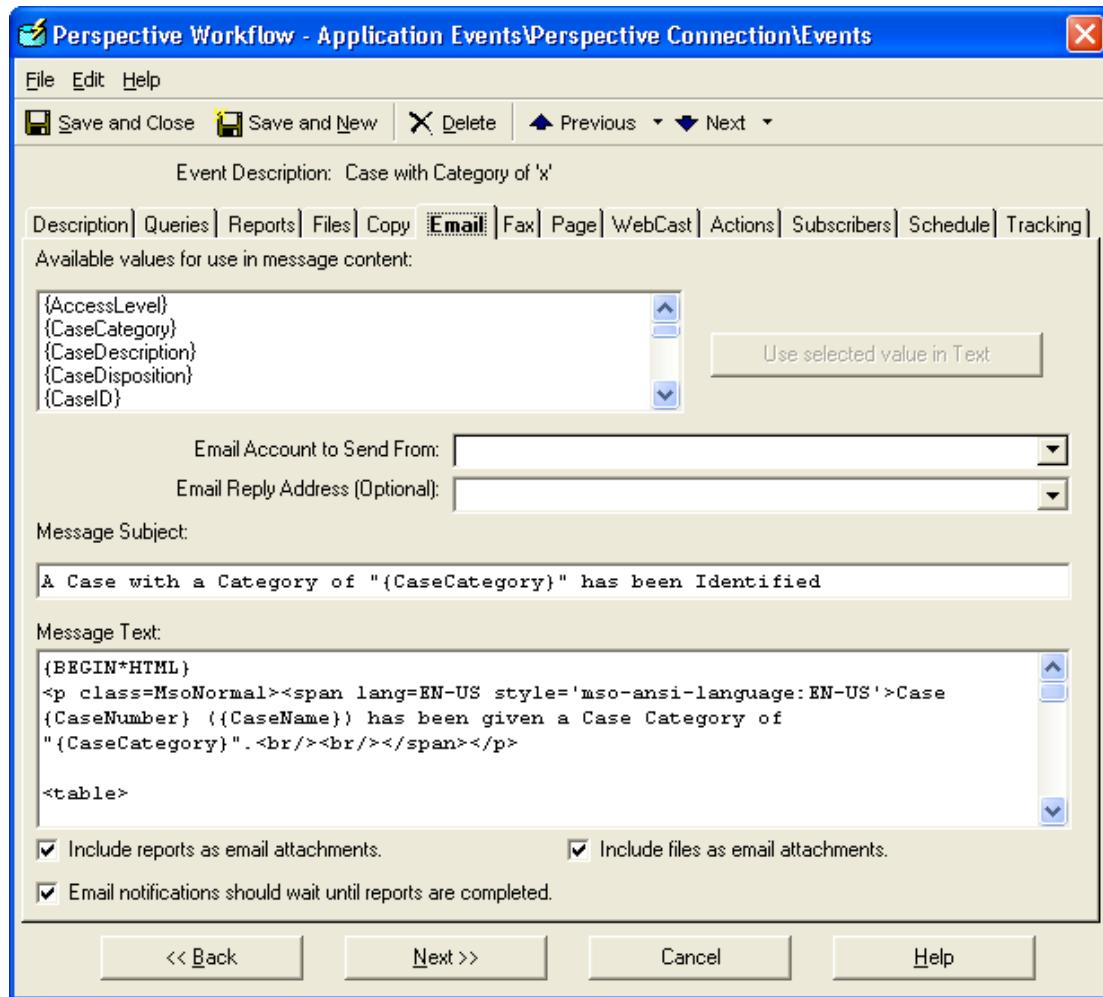
Perspective Workflow's Email server must be enabled to process if you will be sending email alerts.

To view the status of (or start) the Email server, do the following:

1. Log into the Perspective Workflow Administrator.

2. Click on the Activity folder and then on Server Status.

3. If the Email server is not running, double-click on it and place a checkmark in the field called "Allow Server to Process."

4. Click on "Save and Close".

You may delete pending email messages. Open the Administrator, click on the File menu, choose Database Tools, and Remove Pending Items.

Message Formatting Options

HTML Format

HTML is available only if you are using an Internet/SMTP mail sending account.

You may enter HTML syntax directly into the Message Text field or you may create your HTML content outside of Perspective Workflow and then cut-and-paste it into the Message Text field.

Once you have your HTML done and in the Message Text field, do the following:

1. Insert a blank line above the start of your HTML syntax.

2. Scroll the list of Available Values to the very end of the list and select the command {BEGIN*HTML} so that it appears before the start of your HTML syntax.

3. Insert a blank line after the end of your HTML syntax, and select the command {END*HTML} so that it appears right after your HTML syntax.

That's all you need to do to create email alert messages in HTML format.

Controlling the Display Length of a Text Field

You can control the display length of a text field in an alert message. To specify the maximum display length, add a colon followed by the maximum display length, followed by the plus sign ('+') as in:

{Item_Description:25+}

Depending on the email font that an alert recipient uses, this function may also be used to line fields up in a columnar format, as in:

{Item_Description:20+} {Item_Type:6+} {Item_Class:10+}

This method will work if a recipient is not using a proportional spacing font; if they are using proportional spacing, it is suggested that you use an HTML table instead.

Currency Formats

Currency values are formatted according to the regional currency settings for the server on which Perspective Workflow is installed. If a currency field's length is shortened, Perspective Workflow will allocate the indicated number of characters when the field is placed in an alert message.

{net_loss$}	$1250.00	(right-justified)
{net_loss:10$}	$1250.00	(right-justified; allocate 10 spaces)
{net_loss&}	$1250.00	(left-justified)
{net_loss:10&}	$1250.00	(left-justified; allocate 10 spaces)

Numeric Formats

Numeric values are formatted according to the settings for the server on which Perspective Workflow is installed. If a numeric field's length is shortened, controlled Perspective Workflow will allocate the indicated number of characters when the field is placed in an alert message.

{item_units#}	85.50	(right-justified; 2 decimal places)
{item_units:10#}	85.50	(right-justified; 2 decimals; 10 spaces)
{item_units%}	85.50	(left-justified; 2 decimal places)
{item_units:10%}	85.50	(left-justified; 2 decimals 10 spaces)
{item_units!}	85	(right-justified; no decimal places)
{item_units:10!}	85	(right-justified; no decimal; 10 spaces)
{item_units*}	85	(left-justified; no decimal places)
{item_units:10*}	85	(left-justified; no decimal; 10 spaces)

Skipping Fields With Null Values

When formatting an alert message, you may wish to "skip" (and allocate no space to it) if its value is null. (This function checks for "null" only; not for blanks.)

Here's an example:

{BEGIN*REPEAT}
{ItemNo:15+~}
{END*REPEAT}

The tilde (~) indicates that if a field's value is null, no space will be allocated to it. Note that this tilde must be the final formatting command in a field.

<u>Including Both HTML & Plain Text</u>

You can create a single email message that contains both HTML and plain text. For example:

The following incident has an Access Level of 3 or higher:

Incident Number: {IncidentNumber}
Access Level: {AccessLevel}

{BEGIN*HTML}
Your HTML content would go here.
{END*HTML}

If the recipient's email system does not support HTML, they will see only the top section of the message; the content of the HTML will appear as an attachment. If the recipient's email system does support HTML, they will not see only what is between the {BEGIN*HTML} and {END*HTML} labels.

Embedding URL Links in Message

You can send an email with a URL link in it (such as a link to track a package). Make sure that any information required within the URL link (such as the tracking number) is one of the chosen columns in the underlying query.

Then, you could embed a link such as the following (a FedEx example):

http://www.fedex.com/cgi-bin/tracking?action=track&tracknumbers={fedexnumber}

{fedexnumber} is the value from the underlying query.

Advanced Formatting – Crystal Reports

If you need more sophisticated formatting that what is available natively out of Perspective Workflow (e.g., headers/footers, page breaks, sub-totaling, etc.), it is suggested that you use Crystal Reports, as a Perspective Workflow event can populate and generate Crystal Reports and deliver them to their intended recipients.

Begin & End Repeat

The commands {BEGIN*REPEAT} and {END*REPEAT} control three things in an event:

- Whether you send one alert per triggered record, or repeat the details of multiple triggered records in a single alert.

- Whether you generate one report per triggered record, or generate one report for a group of matching records.

- Whether you execute event workflow actions once per triggered record, or once per group of matching records.

If you do not use {BEGIN*REPEAT} and {END*REPEAT} in an event, the event will execute its alerts, its reports, and its workflow actions once for each record that matches the event's criteria.

If you do use {BEGIN*REPEAT} and {END*REPEAT} anywhere within an event, the event will execute its alerts, its reports, and its workflow once per group of matching records.

The {BEGIN*REPEAT} and {END*REPEAT} commands can appear in any one of the following tabs within an event: Email, Fax, Page, Webcast, or Create File (within the Actions tab). But regardless of what tab these commands appear in, their rules apply to all components of the event.

Be careful when using {BEGIN*REPEAT} and {END*REPEAT}, as it must not be used if an event needs to trigger its alerts, its reports, or its actions once for each record that matches the event's criteria.

Repeating Text in an Alert Message

{BEGIN*REPEAT} and {END*REPEAT} let you configure an alert message that contains the details of multiple triggered records. Consider the following alert:

Effective today, you have assignments that are due today or tomorrow, or are past their due date.

Record Number:	*{IncidentCaseID}*
Assignment Date:	*{AssignmentDate}*
Assignment Type:	*{AssignmentType}*
Assigned By:	*{AssignedByFullName}*
Due Date:	*{DueDate}*

If you leave the message like this, Perspective Workflow will send out one alert message per triggered record. But if you wanted to send out one alert message with the details of all matching records in it, you would use the "repeat" command as follows:

Effective today, you have assignments that are due today or tomorrow, or are past their due date.

{BEGIN*REPEAT}
Record Number: {IncidentCaseID}
Assignment Date: {AssignmentDate}
Assignment Type: {AssignmentType}
Assigned By: {AssignedByFullName}
Due Date: {DueDate}
{END*REPEAT}

One Message for All Matching Records

If you wish to generate one alert message for all matching records, use {BEGIN*REPEAT} and {END*REPEAT} in the event. These commands do not need to be on a line by itself; it may be on the same line as text or a field value.

Position your cursor in your alert message where you wish to begin the "repeating" of message details; scroll to the end of the list of available values and select {BEGIN*REPEAT}.

Next, position your cursor after the end of text that you wish to be repeated and select {END*REPEAT} from the list of available values.

One Message Per Recipient

To configure an event to send one alert message per recipient, such as sending each case supervisor a list of their assigned cases, you would:

1. Open the event's query, go to the "Columns" tab, and make sure the field that contains the recipient's delivery address is included as a column.

2. Go to the "Sorting" tab, and sort the query according to the recipient's name (or delivery address).

3. Include {BEGIN*REPEAT} and {END*REPEAT} in the alert message.

4. Go to the "Subscribers" tab and click on the "Advanced" sub-tab.

5. In the grid in the lower half of this window, select the field that contains the recipient's delivery address. (Once you click in a field, a drop-down list displays all of the associated query's data fields.)

Note that the event could send each alert to the case supervisor <u>and</u> to another individual. You would follow the steps listed above and specify the second individual as a "standard" subscriber.

<u>One Message Per Recipient and Per Break Field</u>

Configuring an event to send one alert message per recipient using a secondary break field would, for example, send each regional manager a separate alert <u>for each site</u> in which they have open incidents. To configure this, you would:

1. Open the event's query, go to the "Columns" tab, and make sure the field that contains the recipient's delivery address is included as a column. Select the "break field" (e.g., site) also as a column.

2. Go to the "Sorting" tab, and sort the query first according to the recipient's name (or delivery address) and second by the break field.

3. Include {BEGIN*REPEAT} and {END*REPEAT} in the alert message.

4. Go to the "Subscribers" tab and click on the "Advanced" sub-tab.

5. In the grid in the <u>lower</u> half of this window, select the field that contains the recipient's delivery address. (Once you click in a field, a drop-down list displays all of the associated query's data fields.

6. In the grid in the <u>upper</u> half of this window, click on the <u>first</u> field and select your break field. (Once you click in this field, a drop-down list of query data fields is displayed.) Do not select any delivery method.

<u>One Message Per Break Field</u>

Configuring an event to send one alert message per break field would, for example, let you send a supervisor separate alerts listing each officer's incomplete assignments. To configure this, you would:

1. Open the event's query, go to the "Columns" tab, and make sure the field that contains the break field (e.g., officer) is selected as a column.

2. Go to the "Sorting" tab, and sort the query by the break field.

3. Include {BEGIN*REPEAT} and {END*REPEAT} in the alert message.

4. Go to the "Subscribers" tab, click on the "Standard" sub-tab, and select the subscriber.

5.   Click on the "Advanced" sub-tab and in the grid in the <u>upper</u> half of this window, click on the first field and select your break field. (Once you click in this field, a drop-down list of query data fields is displayed.) Do not select any delivery method.

<u>Repeat Notes</u>

- The "repeat" function can appear only once within a single event.

- If you are using "repeat" in your email message, you can use that same alert text in the fax, page, or Webcast tabs by typing in "=email_message_text" in the message text fields of those other delivery methods.

- If your event uses multiple queries, the "recipient address" and "break" fields can refer only to fields from the <u>first</u> query in the event's list of queries.

HTML Table Syntax

If you are not familiar with HTML syntax and wish to use an HTML table within your alert message, PPM 2000 suggests the following free, non-technical HTML Table Design tool available on the Internet:

http://www.spectrum-research.com/V2/generators/tableframe.asp

Or just cut-and-paste the following HTML table syntax and fill in the header and data field sections accordingly:

```
{BEGIN*HTML}
<table class='mytable'>
      <thead>
            <tr class='mytable'>
                  <th class='mytable'>Column 1 Heading</th>
                  <th class='mytable'>Column 2 Heading </th>
                  <th class='mytable'>Column 3 Heading </th>
                  <th class='mytable'>Column 4 Heading </th>
                  <th class='mytable'>Column 5 Heading </th>
            </tr>
      </thead>
      <tbody>
            {BEGIN*REPEAT}
            <tr class='mytable'>
                  <td class='mytable'>{Data Field 1}</td>
```

```
                    <td class='mytable'>{Data Field 2}</td>
                    <td class='mytable'>{Data Field 3}</td>
                    <td class='mytable'>{Data Field 4}</td>
                    <td class='mytable'>{Data Field 5}</td>
            </tr>
            {END*REPEAT}
        </tbody>
</table>
{END*HTML}
```

This HTML syntax creates a table with five headings (the lines that begin with "<th"). The "repeat" function repeats the details lines (the lines that begin with "<td>") so that multiple records can be grouped together in a single table.

Email Attachment Handling

- Include Reports as Email Attachments: If an event has associated reports, you may specify whether the reports will be attached to the outgoing email.

  If using Perspective Workflow to generate and distribute a large number of reports, it's more efficient to distribute the reports via FTP or the Web and use email to notify people that those reports are available.

- Include Files as Email Attachments: If an event has associated files, you may specify whether the files will be attached to the outgoing email.

  If the event's query includes a column called "attachment_files", the files referenced in that field will also be attached.

- Email Notifications Should Wait Until Reports Are Completed: If an event has associated reports which are not going to be attached, you should have the alert wait to be sent until the reports are finished generating.

What Needs to Happen to Send Email Alerts

In order to send email alerts, all of the following need to be true:

- The event must have an email subject, message text, and a valid email sending account

- There must be at least one subscriber selected to receive alerts via email who is "active" with valid email addresses, and their "delivery times" must allow message receipt.

- The Windows or Desktop service and email server must be running.

- The event's query must retrieve matching records and f the event has been triggered (and no new matching records exist), you must either remove triggered items or the event must "repeat notifications for triggered items".

Monitoring Email Alerts

The Perspective Workflow Monitor tracks the status of email alerts, including those that are "pending", have been "sent", and those that are in an "error" state.

If email alerts fail to complete successfully because of errors, you may try to correct the error, mark the delivery as "complete", or manually delete the erroring delivery. (See "Corrective Actions" in the Administrator module.) Perspective Workflow will attempt to re-deliver an erroring email message every minute.

Fax Message

Perspective Workflow includes both an internal faxing solution and integration with Microsoft Fax (recommended).

If you are using Microsoft Fax, you do not need to enter any information on the Fax tab, as the integration utilizes a VB script. Microsoft Fax supports plain-text and rich-text faxing; Perspective Workflow's embedded fax technology supports only plain-text documents.

To view or modify the (embedded-technology) fax alert message associated with an event, expand the Deliverables branch and then double-click on the Fax branch. If an event has no fax alert message and you wish to add it, double-click on the event name and click on the Fax tab. You will see the following:
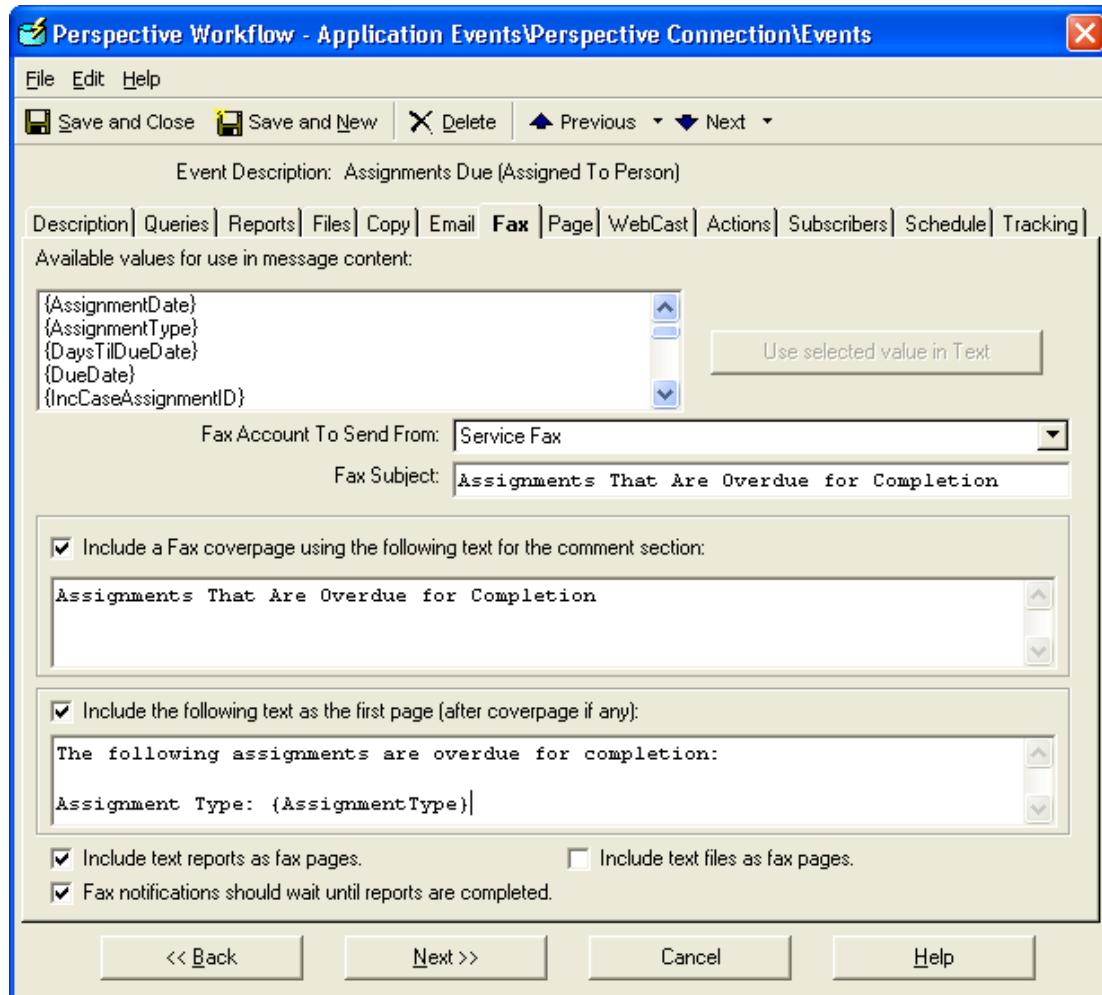
- <u>Fax Account to Send From</u>: The name of the account that the fax will be sent from (configured in the Administrator module).

- <u>Fax Subject</u>: A short description of the purpose of the fax.

Perspective Workflow's Fax server must be enabled to process if you will be sending faxes using the embedded faxing technology; the "Action" server must be enabled to send faxes via Microsoft Fax.

To view the status of (or start) these servers, do the following:

1. Log into the Perspective Workflow Administrator.

2. Click on the Activity folder and then on Server Status.

3. If the Fax or Action servers are not running, double-click on either and place a checkmark in the field called "Allow Server to Process."

4.   Click on "Save and Close".

You may delete pending faxes. Open the Administrator, click on the File menu, choose Database Tools, and Remove Pending Items.

Fax Cover Page, Subject & Message Text

- Include a Fax Coverpage: Check this box if you wish to include a cover page for the fax. The cover page can include hard-coded text, database fields and date variables. This field is limited to 230 characters.

- Include the Following Text: The contents of the fax. They can include hard-coded text, field values, and date variables and can also include the {BEGIN*REPEAT} and {END*REPEAT} functions.

Fax Text = Email Text

Perspective Workflow gives you a shortcut to re-use your email message configuration as the contents for the fax message. To do so, type in "=email_message_text" (without the quotations) in the fax text field as follows:
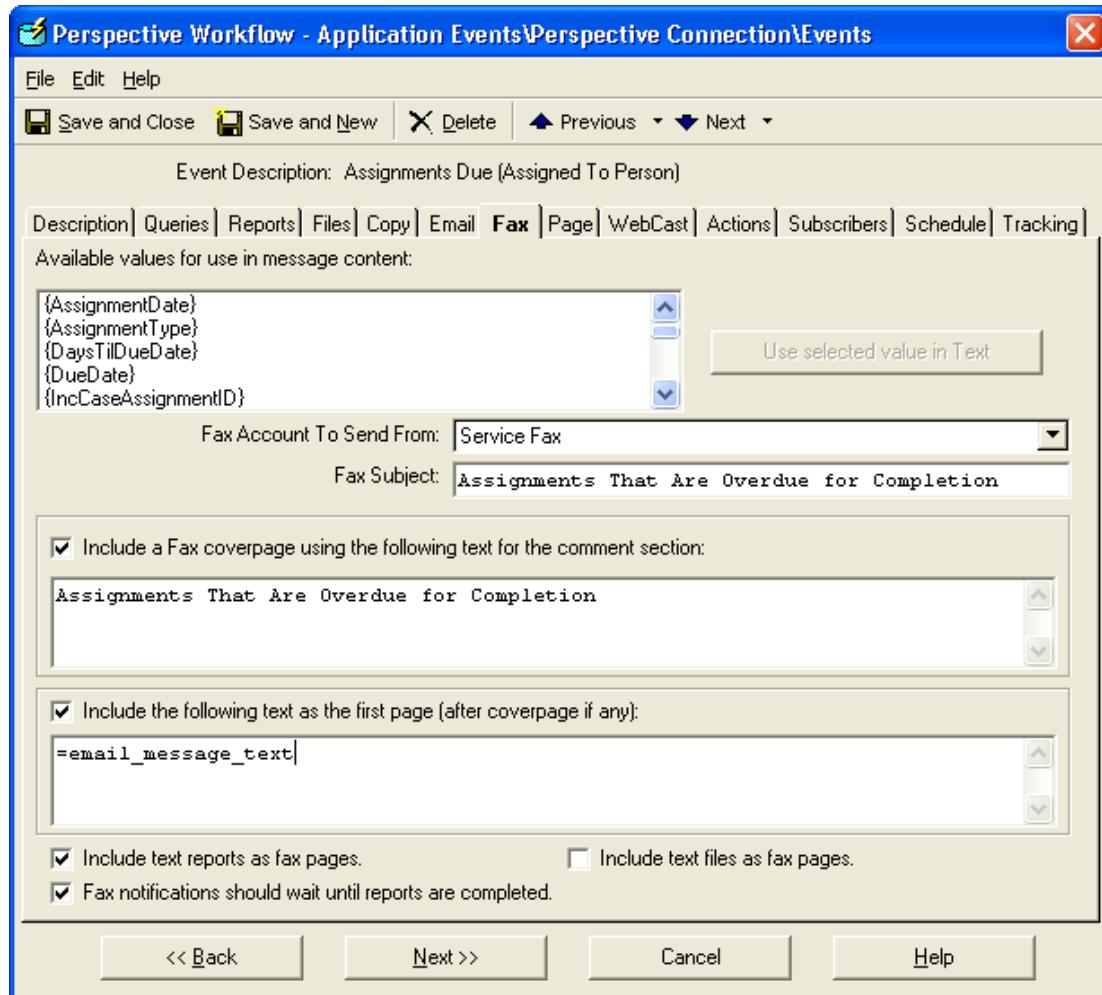
Fax Message Handling

- <u>Include Text Reports as Fax Pages</u>: If an event has associated reports (in ascii), you may specify whether the reports will be included in the outgoing fax message.

- <u>Include Text Files as Fax Pages</u>: If an event has associated plain text files, you may specify whether the files will be included in the outgoing fax message.

  If the event's query includes a column called "attachment_files", Perspective Workflow will fax those (ascii) files along with any other files specified on the "Files" tab.

- <u>Fax Notifications Should Wait Until Reports Are Completed</u>: If an event has associated reports which are not included in the outgoing fax, you should have the event wait until the reports are generated before sending the fax message.

What Needs to Happen to Send Fax Alerts

To use the embedded fax technology, <u>all</u> of the following need to be true:

- The event must have either a header page or message text, a valid fax sending account, and a valid fax port defined in the Administrator.

- There must be at least one subscriber selected to receive alerts via fax who is "active" with valid fax addresses, and their "delivery times" must allow message receipt.

- The Windows or Desktop service and fax server must be running.

- The event's query must retrieve matching records and f the event has been triggered (and no new matching records exist), you must either remove triggered items or the event must "repeat notifications for triggered items".

Monitoring Fax Alerts

The Perspective Workflow Monitor tracks the status of fax alerts, including those that are "pending", have been "sent", and those that are in an "error" state.

If fax alerts fail to complete successfully because of errors, you may try to correct the error, mark the delivery as "complete", or manually delete the erroring delivery. (See "Corrective Actions" in the Administrator module.) Perspective Workflow will attempt to re-deliver an erroring fax message every minute.

Pager/PDA Message

Perspective Workflow supports SMS (short message syntax) paging.

By default, Perspective Workflow uses a modem to send pager messages; however most paging vendors support the use of email to send pager messages as in:

yourphonenumber@page.nextel.com
yourphonenumber@vtext.com

Please contact your paging vendors to learn the appropriate paging address format.

To view or modify the pager alert message associated with an event, expand the Deliverables branch and then double-click on the Page branch. If an event has no pager alert message and

you wish to add it, double-click on the event name and click on the Page tab. You will see the following:
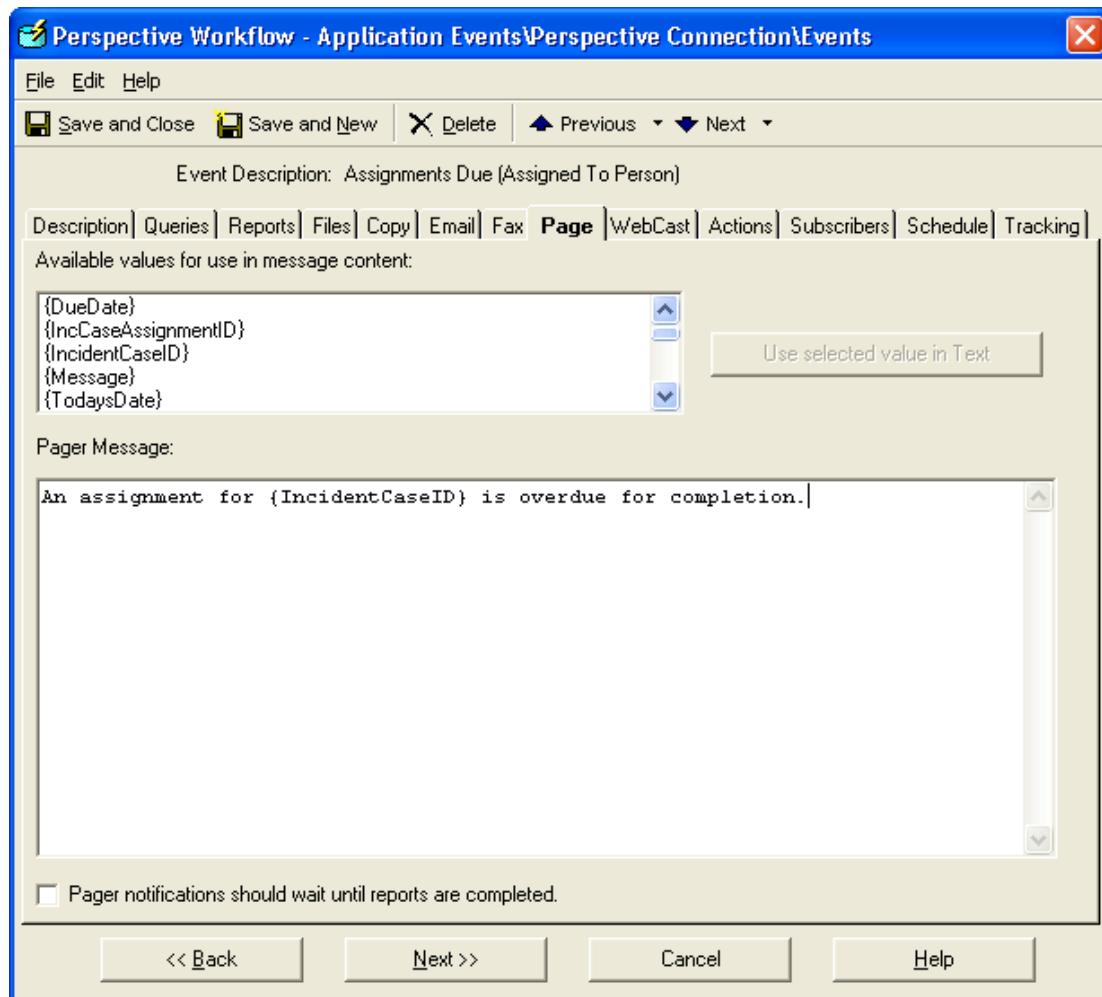
- • Pager Message: You can place as much or as little text as you wish in the body of a pager message; you can include hard-coded text, database field values, and date variables in the pager message text.

  You can also use {BEGIN*REPEAT} and {END*REPEAT} as detailed in the "Email Tab" section.

- • Pager Notifications Should Wait Until Reports Are Completed: If an event has associated reports, you should have the event wait until the reports are generated before sending the pager message.

Perspective Workflow's Page server must be enabled to process if you will be sending pager messages. To view the status of (or start) these servers, do the following:

1. Log into the Perspective Workflow Administrator.

2. Click on the Activity folder and then on Server Status.

3. If the Page server is not running, double-click on it and place a checkmark in the field called "Allow Server to Process."

4. Click on "Save and Close".

You may delete pending pages. Open the Administrator, click on the File menu, choose Database Tools, and Remove Pending Items.

What Needs to Happen to Send Pager Alerts

In order to send pager messages, all of the following need to be true:

- The event must have pager message text and you must have a valid pager port and pager service(s) defined in the Administration module.

- There must be at least one subscriber selected to receive alerts via pager who is "active" with valid pager addresses, and their "delivery times" must allow message receipt.

- The Windows or Desktop service and pager server must be running.

- The event's query must retrieve matching records and f the event has been triggered (and no new matching records exist), you must either remove triggered items or the event must "repeat notifications for triggered items".

Monitoring Pager Alerts

The Perspective Workflow Monitor tracks the status of pager alerts, including those that are "pending", have been "sent", and those that are in an "error" state.

If pager alerts fail to complete successfully because of errors, you may try to correct the error, mark the delivery as "complete", or manually delete the erroring delivery. (See "Corrective Actions" in the Administrator module.) Perspective Workflow will attempt to re-deliver an erroring pager message every minute.

Webcast (Dashboard Alerts) Tab

The Webcasting ("dashboard alerts") module requires a few additional steps for configuration; please refer to the "Dashboard Alerts" section of the "Advanced Functionality" chapter for details.

Actions (Workflow) Tab

To view, modify or remove an action associated with an event, expand the "Actions" branch beneath an event and double-click on the corresponding action you wish to view, modify, or delete. If an event has no actions and you wish to add one, double-click on the event name and click on the "Actions" tab.

To view or modify the configuration of a Visual Basic script associated with an event, right-click on the script name and select "Edit". Refer to the "Visual Basic Scripting" section of the "Advanced Functionality" chapter for details on script components and configuration.

If an event is configured to execute one action for each record that meets the event's criteria, the event must not use {BEGIN*REPEAT} and {END*REPEAT}.

To enable the "Action" server, follow these steps:

1. Log into the Administrator click on the Activity folder and then on the Server Status folder.

2. Double-click on the "Action Server" and check the field called "Allow Server to Process."

3. Click on "Save and Close" at the top-left of your window.

The Six Types of Workflow

An event may execute any combination of the following actions:

*   Create a file containing content from a triggered event.

*   Execute SQL (structured query language) statements.

*   Run stored procedures.

*   Run executable programs.

*   Run VB (visual basic) scripts.

All of these may incorporate data from the corresponding triggered event and the order in which they are executed is: create file, execute SQL, run stored procedures, run programs and run VB scripts.

Create File

An event can take its "triggered" data and write it out to a file as shown:
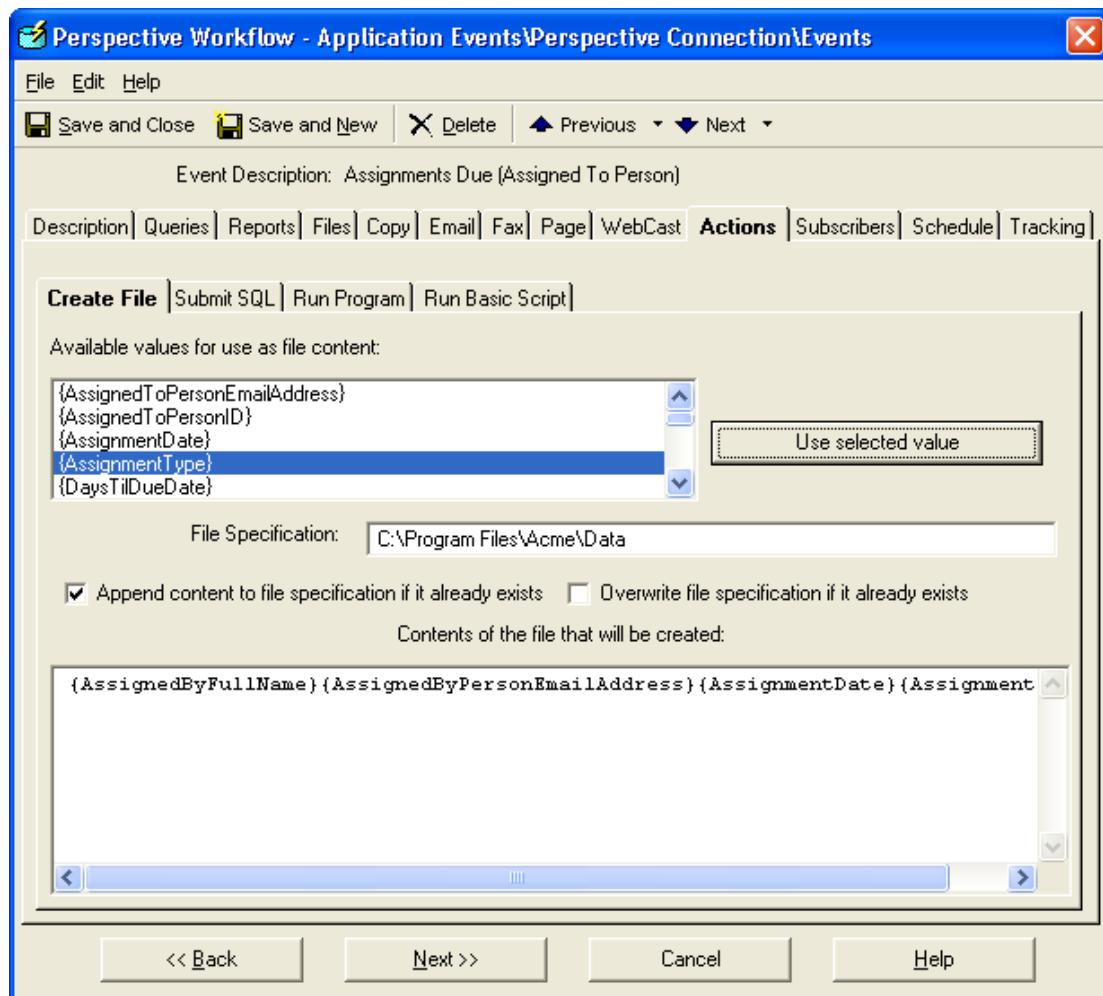
Files created in this manner can be used for import into another application, to create log files of triggered event data, or to create a file for a mailing or fulfillment house. The file can contain hard-coded text, field values, and date variables. For each file you need to specify:

• File Specification: The name of the file to be created. This name may be hard-coded or it may include field and date variables.

- Append Content to File: If the named file already exists, checking this box will cause the event to add its data to the existing file.

- Overwrite File Specification: If the named file exists, checking this box will cause the event to delete the existing file and overwrite it with new contents.

- Contents of the File: Click in this box and begin entering any combination of hard-coded test and field (and date) variables. You may separate fields by using a comma, semi-colon, or any other valid punctuation. Use Ctrl/Tab to create tab-based separations. If the event's query uses the {attachment_files} function, you may reference this field as a data field variable.

  You can use {BEGIN*REPEAT} and {END*REPEAT} in your file as well as the field formatting commands (detailed earlier in this chapter).

Submit SQL/Stored Procedure

SQL statements (and stored procedures) can be used to add, update, or delete records from an application database. Note the following:

- If performing a database update, your SQL must include a "where clause" to ensure that it updates only the appropriate records.

- If using SQL or a stored procedure, an event must not use the {BEGIN*REPEAT} and {END*REPEAT} commands. (This ensures that your SQL will be executed once per triggered record that meets the event's criteria.)

- All standard SQL syntax (for the database and driver selected) is supported.

The Submit SQL tab looks like the following:
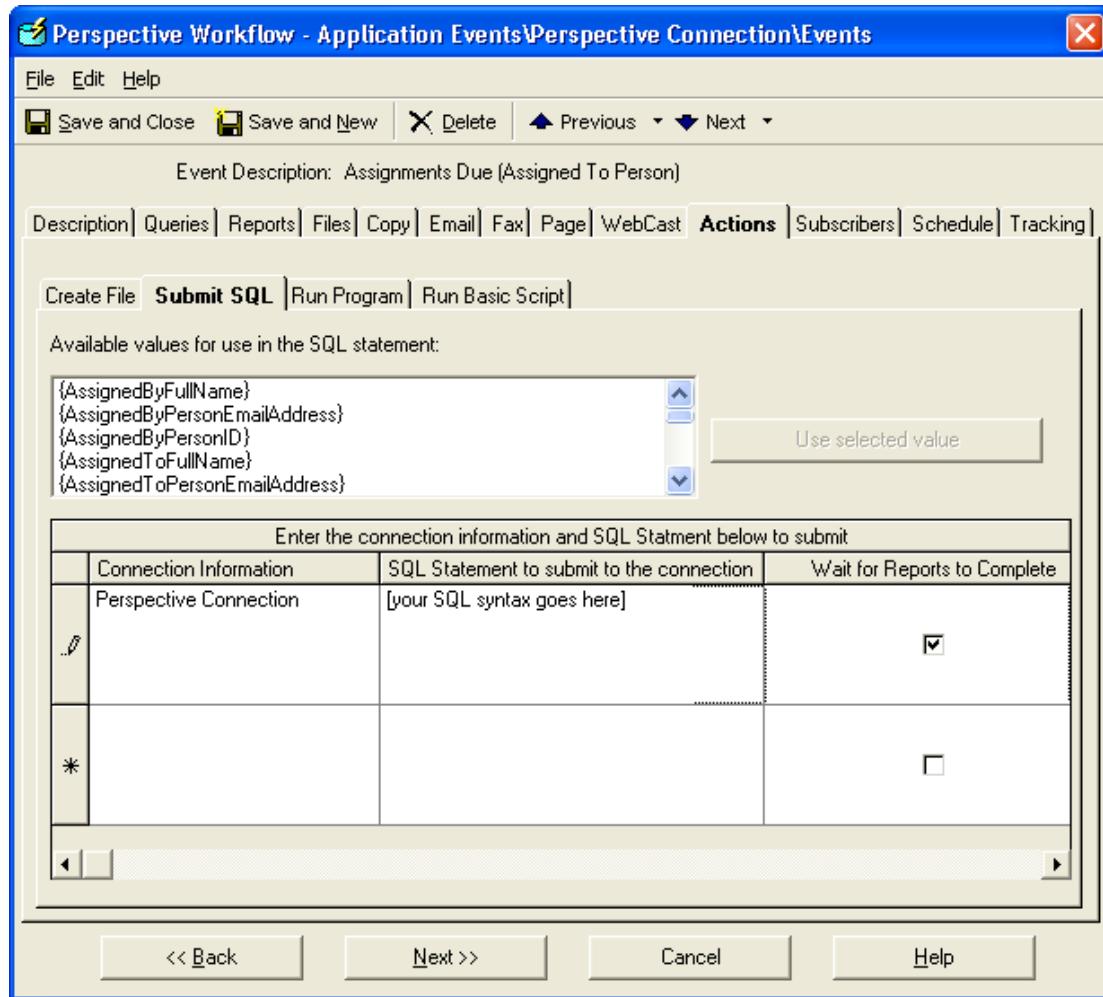
- Connection Information: Click in this field, click on the list button that appears there, and then choose the ODBC connection that will be used by the SQL statement or stored procedure. If the ODBC connection does not exist, click on the "New Connection" button to create the source.

- SQL Statement: Enter the SQL syntax that will be executed by this event.

  You may use any combination of SQL syntax and data field (and date) variables in your SQL syntax; be sure to enclose all date and text-based data field variables within single quotes (not necessary with numeric fields). If the event's query uses the {attachment_files} function, you may reference this field as a data field variable.

  All standard SQL commands (such as "insert", "update" and "delete") are supported in the SQL action tab. You cannot use {BEGIN*REPEAT} and {END*REPEAT} in your SQL, but you may use the field formatting controls details earlier in this chapter.

  The "where clause" in your SQL tells Perspective Workflow which records to update.

- <u>Wait for Reports to Complete</u>. If the corresponding event has associated reports, you may wish for the reports to generate before your SQL is executed. (E.g., You may wish to run a report on data that is subsequently modified by your SQL.)

If you have an event which needs to execute SQL once per triggered record, and also needs to generated a summarized alert message (using {BEGIN*REPEAT} and {END*REPEAT}), you'll need to configure <u>two events</u>—one to do the summarized alert and another to do the triggered SQL workflow.

If an event has associated files – either from the "Files" tab, or if the event's query uses the "attachment_files" column -- those files will be stored in a variable called "attachment_files" which may be used in your SQL or stored procedure.

To run a stored procedure instead of a SQL statement, choose the ODBC connection and then specify the procedure name, as in "dbo.myprocedurename". To pass parameters into your stored procedure, use the syntax:

dbo.myprocedurename '{value1}','{value2}',{value3}

<u>Run Program</u>

The "Run Program" tab looks like the following:
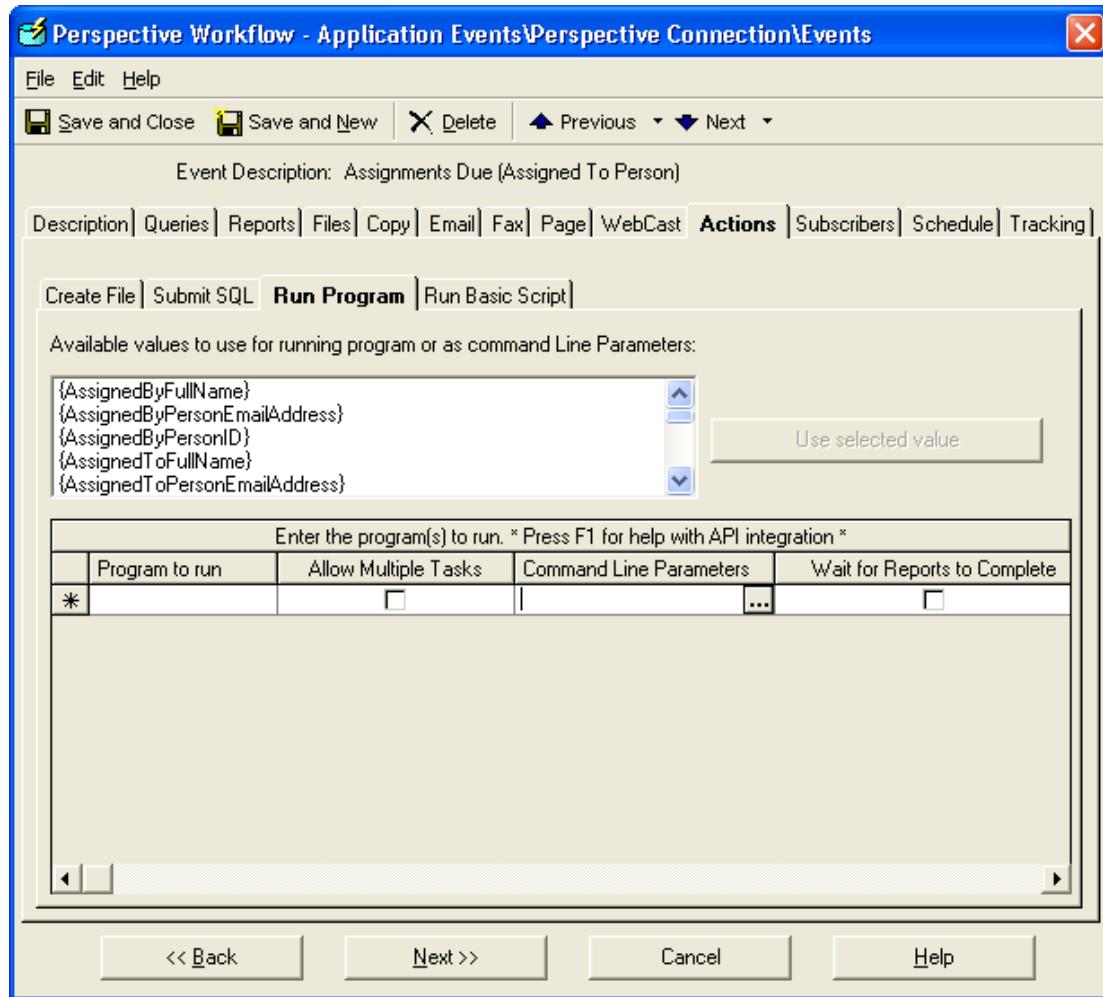
- **Program to Run**: Click in this field, click on the list button that appears there, and select the executable program you wish the event to execute.

- **Allow Multiple Tasks**: This lets you specify whether the event will run only a single copy of this task at any one time, allows multiple copies to run simultaneously. (The primary consideration here is system performance. Suggested setting is unchecked.)

- **Command Line Parameters**: Events use command line parameters to pass data from triggered records into an executable program. Parameters may include hard-coded values and data field (and date) variables; be sure to enclose all date and text-based data field variables within single quotes as in '{ACCOUNT_ID}' (not necessary with numeric fields). Data fields may also use any of the formatting controls detailed earlier in this chapter.

  If the event's query uses the {attachment_files} function, you may reference this field as a data field variable.

To add parameters, click in the "Command Line Parameters" field and then click on the value you wish to use from the "Available values" list.

- <u>Wait for Reports to Complete</u>. If the corresponding event has associated reports, you may wish for the reports to generate before your SQL is executed. (E.g., You may wish to run a report on data that is subsequently modified by your SQL.)

Any program an event runs must not prompt for any user input. Also, if a program calls any "dll" files, put these files in the "windows/system" directory.

<u>Run Basic Script</u>

The most powerful event action is to run a Visual Basic ("VB") script:
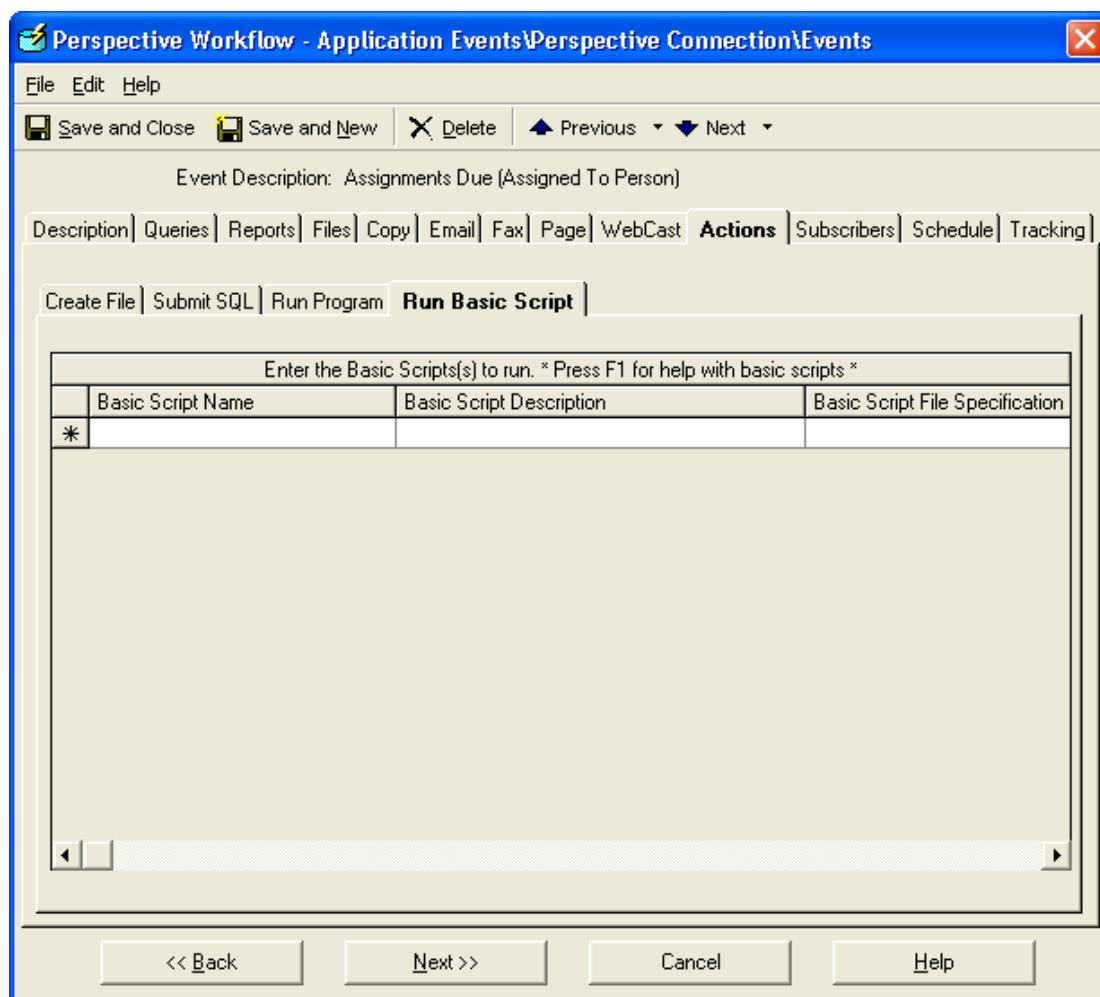
VB scripts are designed within Perspective Workflow (see the "Visual Basic Scripting" section in the "Advanced Functionality" chapter) and require expertise in Visual Basic syntax.

To view or change a script associated with an event, double-click on the script name. To add a script to an event, double-click on the event name, click on the Actions tab, then on the Run Basic Script tab, click in the field called "Basic Script Name" and click on the List button.

To view the programming code behind a script, right-click on the script name and select "Edit". You will be brought to a window from which you can view (and test) the corresponding script.

Any script an event runs must not prompt for any user input.

Monitoring the Status of Workflow Actions

The Perspective Workflow Monitor tracks the status of workflow actions, including those that are "pending", have been "completed", and those that are in an "error" state.

If workflow actions fail to complete successfully because of errors, you may try to correct the error, mark the action as "complete", or manually delete the erroring action. (See "Corrective Actions" in the Administrator module.) Perspective Workflow will attempt to re-deliver an erroring workflow action every minute.

Subscribers Tab

The "Subscribers" tab lets you specify who will receive alerts about a triggered event and via what method (email, fax, pager, copy [FTP], or Webcast).

To view, modify, or remove a subscriber associated with an event, expand the Subscribers branch and then double-click on the subscriber you wish to access.

To add a subscriber to an event, double-click on the event name and click on the "Subscribers" tab.

To view or modify the configuration of a subscriber associated with an event (e.g., their delivery addresses, etc.), right-click on the subscriber name and select "Edit". Refer to the chapter on Subscribers for details on their configuration.

When you select a subscriber associated with an event, a window like the following will appear:
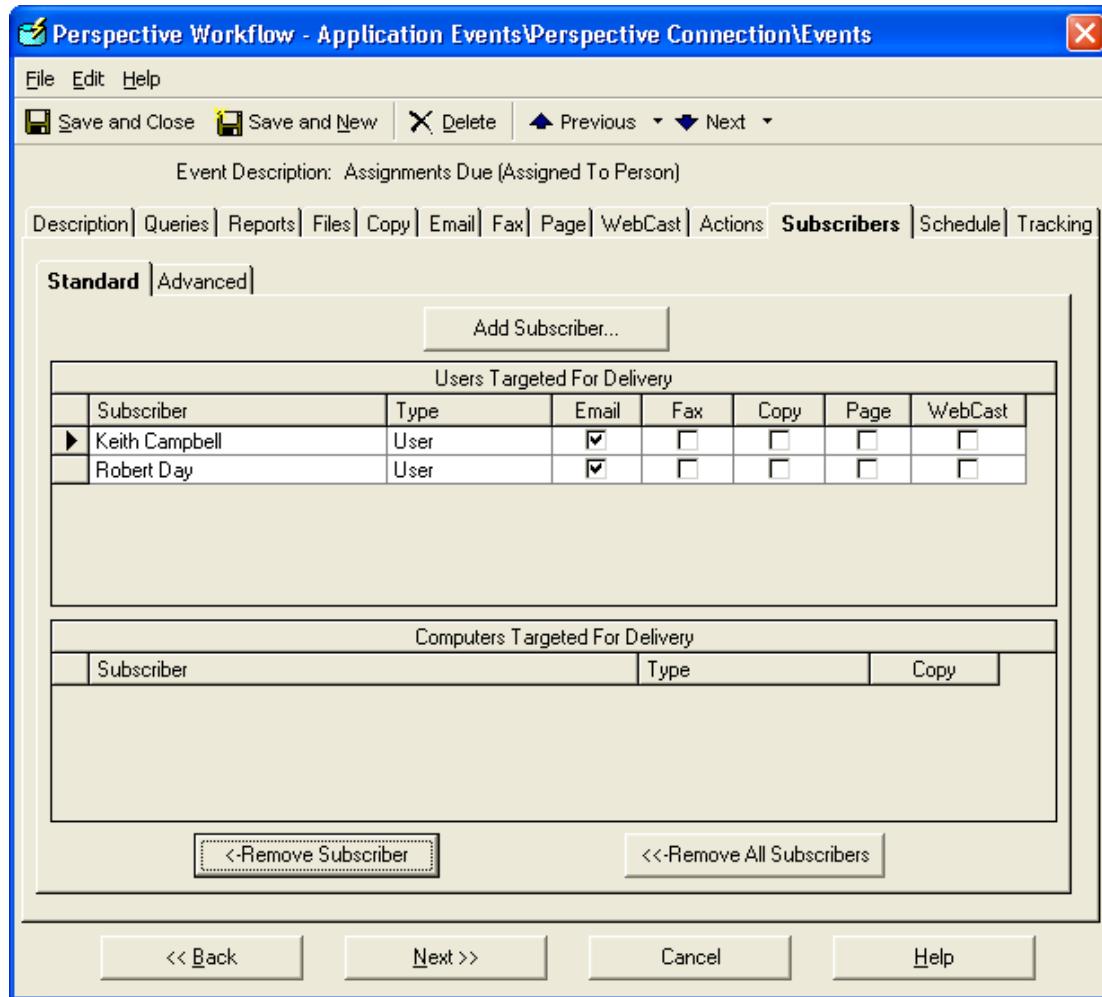
The Subscribers tab is divided into "Standard" and "Advanced"; standard subscribers are pre-determined groups or individuals such as "John Smith", "Mary Reynolds", and "Perspective Supervisors".

"Advanced" subscribers are people who are related to the event that has been triggered. E.g., Send an email to the "Case Supervisor" associated with the case that triggered the event. An event may send alerts to a combination of "standard" and "advanced" subscribers.

Monitoring the Status of Alerts

The Perspective Workflow Monitor tracks the status of all triggered alerts for an event's subscribers, including those alerts that are "pending", have been "completed", and those that are in an "error" state.

If alerts fail to complete successfully because of errors, you may try to correct the error, mark the action as "complete", or manually delete the erroring alert. (See "Corrective Actions" in the

Administrator module.) Perspective Workflow will attempt to re-deliver an erroring alert action every minute.

To see the alerts queued-up for subscribers, follow these steps:

1. Open the Monitor, expand the "Application Events" branch and then click on the "Triggered Today" branch.

2. Single-click on the triggered event whose alerts you wish to track.

3. Click on the "Deliverables" button to see the subscribers for the event.

To view the text of an alert message, point your cursor at the column (in the Monitor grid) that contains the email, fax, pager, or Webcast text and a pop-up window containing the alert message text will appear.

Standard Subscribers

You can send alerts to people (individually or in groups) or to computers (individually or in groups). People can be notified via email, fax, copy/ftp, pager, and Webcast; computers can be notified via copy/ftp. Only an event's associated reports or files may be copied using the ftp delivery method.

To add a standard subscriber to an event, navigate to the "Subscribers" tab and click on the "Add Subscriber" button. You will be shown a list of subscriber groups:
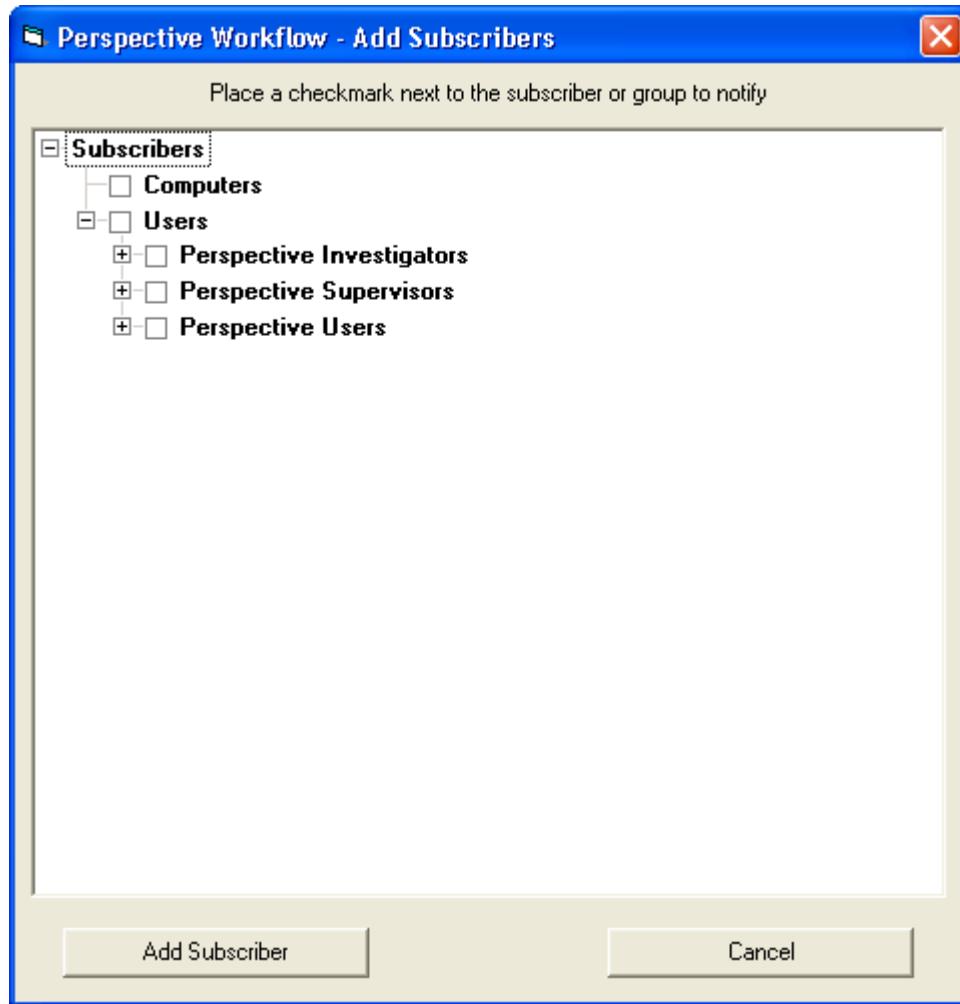
To send alerts to all the members of a group, click the checkbox to the left of the group's name. If you select a group, all members will be notified via the same delivery method(s). To alert specific subscribers, expand the group to which they belong and place a checkmark in the box to the left of the subscriber's name.

An event can notify any combination of groups and individuals. When done, click on the "Add Subscriber" button and select the methods by which the selected groups or individuals will be notified.

To remove a subscriber from an event, highlight the subscriber record you wish to remove, and click on the "Remove Subscriber" button.

Advanced Subscribers

The Advanced subscribers tab is where you can specify that you wish an event to deliver its alerts to one or more people who are associated with the record being triggered (such as notifying the case supervisor when a new case is created).

(The upper Advanced Subscriber grid is also used to control message "breaking"; please refer to the section of this chapter titled "Begin & End Repeat" for details.)

Subscribers Using the Lookup Key

The upper grid in Advanced subscribers is used if you are working with an application that does not store peoples' delivery (such as email) addresses. In such a case, Perspective Workflow stores the email addresses, and each address is linked to a database record via a "lookup key".

For example, a human resources application might store officer records identified by a unique ID. Each officer has a subscriber record in Perspective Workflow and within each of these records is a "lookup key" field which contains an officer's ID. Thus when an event is triggered, Perspective Workflow can retrieve the ID of the officer to be notified, locate that ID in the subscriber database, and then send the alert to that subscriber's address.

To use the lookup key function, follow these steps:

1. Click on the Subscribers "Advanced" tab.

2. Click in "Database Field" for the first line in the top grid. Click on the List button, and select the database field that contains the "lookup value" that will be used to locate the corresponding subscriber in Perspective Workflow.

3. Click on the delivery methods that the subscribers will be notified by.

Note that you can also use groups for subscribers using the "lookup value". Identify the names of groups that are used in the application being monitored, and create identically-named groups (case-sensitive!) in Perspective Workflow. Then, for an event that will notify a group of users, use the second line in the top grid to refer to the database field that contains the group name to be notified. All members in the correspondingly-named subscriber group in Perspective Workflow will be notified.

<u>Subscribers Using Field-Based Addresses</u>

As long as an event's query retrieves the field that contains a person's delivery address (such as the email address of the case supervisor associated with a case), Perspective Workflow can deliver alerts to that subscriber.

Follow these steps to select subscribers whose addresses are contained with one or more database fields:

1. Click in the first field in the lower grid on the Advanced tab and click on the List button that appears there.

2. Select the database field that contains the address you wish the alert sent to.

3. Use the second and third fields in this grid to select "cc" and/or "bcc" addresses; note that you cannot have a "cc" or "bcc" address unless you have also chosen a primary delivery address (in the first field in this grid).

4. Use the remaining grid fields to refer to additional database fields containing a subscriber's fax, page, or Webcast (dashboard) addresses.

If an event needs to send alerts to <u>multiple</u> addresses, you'll need to concatenate the address fields (in the underlying query) into a single database field. Separate each email address from the next with a comma and limit the total length of all email address to no more than 255 characters.

Schedule Tab

To have an event run, it must be "active" and it must have a schedule. Expand an event's components, and the first component will show whether the event is active or inactive. If inactive (and you wish to activate), double-click on the event name and place a checkmark in the "Active" field.

(To inactivate an event, double-click on the event name and remove this checkmark.)

If the event is active, you may view or modify its schedule by right-clicking on the schedule branch and choosing "Edit". You will see the following window:
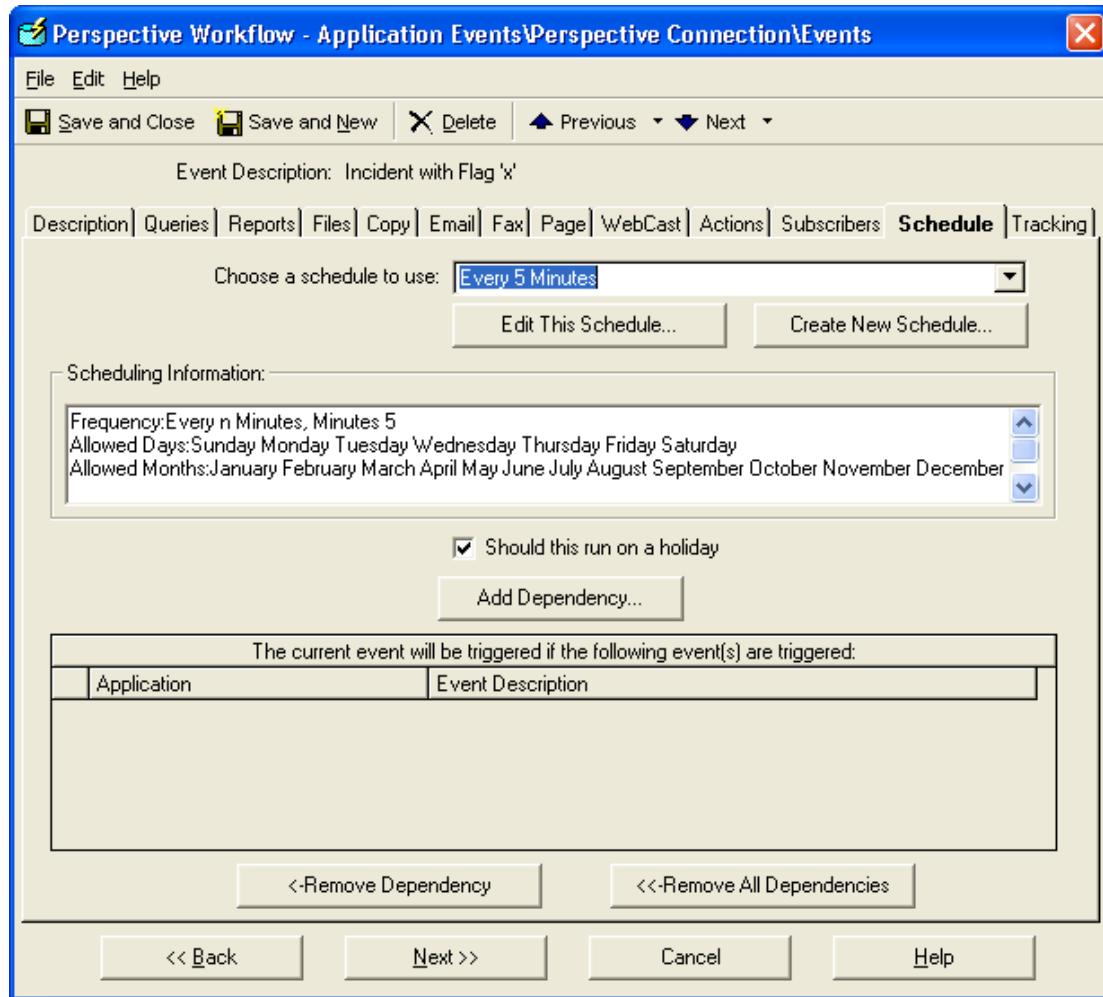
- <u>Choose a schedule to use</u>: Select the recurring schedule that represents how often you want Perspective Workflow to check to see if this event's conditions exist. The system comes pre-configured with about 10 schedules; you may add to or modify these.

    - If you wish to test an event, do <u>not</u> give it a very frequent schedule (such as every 5 minutes). Instead, give the event a schedule of "none" and then use the option to "Schedule This Now" for on-demand submission of an event.

    - The schedule called "When email arrives" is for use only with events that are monitoring the content of incoming email messages.

    - If an event needs to execute in real-time, use a database trigger instead of scheduling the event for periodic submission.

    - For frequencies not available via the scheduling options, use the event's query to restrict when the event can run. For example, to run an event on "the first Monday of a

month", use a schedule of "every Monday" but then use your query to check for a "day number" that falls between one and seven.

Creating/Editing a Schedule

To create or edit a schedule, click on the "Create New Schedule" or "Edit This Schedule" buttons:
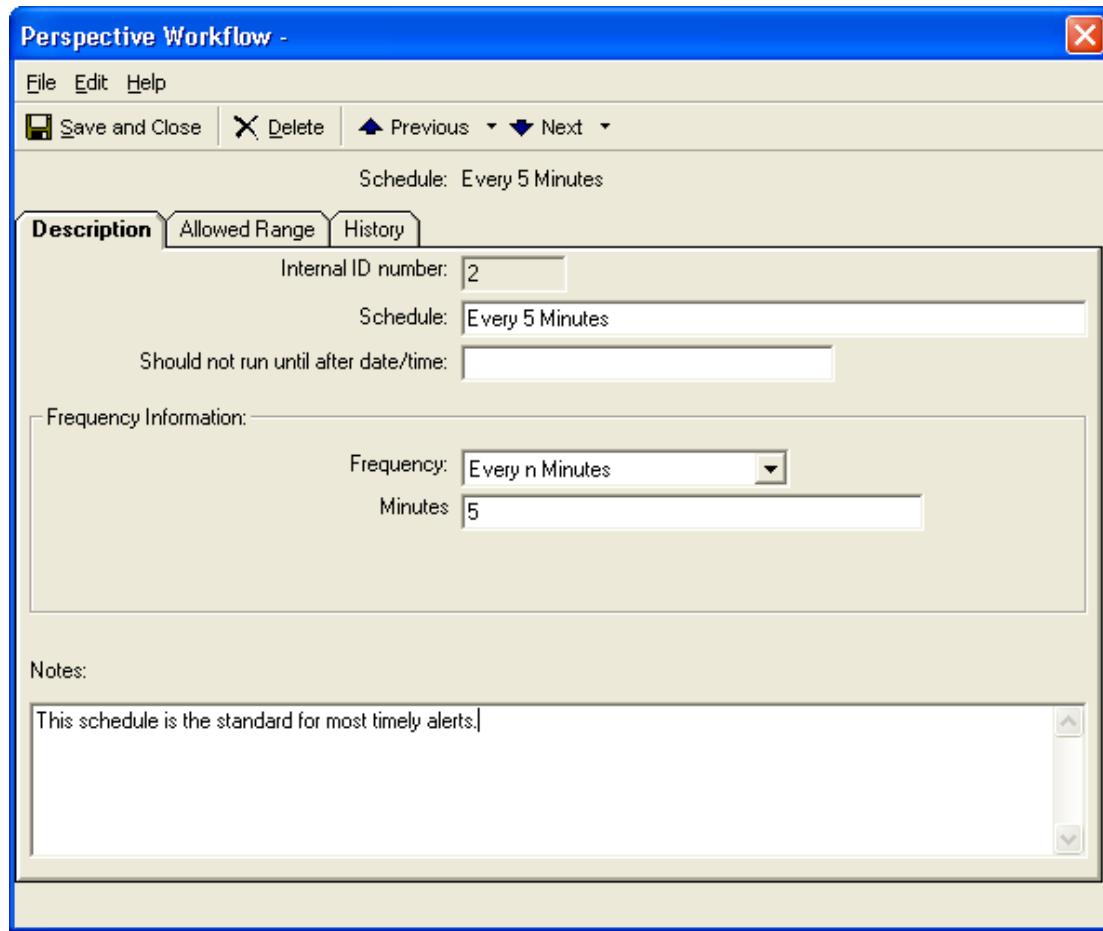
(You can also create a new schedule by right-clicking on the "Scheduled" tab in the Navigator and choosing "Create New Schedule".)

- <u>Schedule</u>: Type in a description of the schedule (e.g., "Everyday at 3 PM").

- <u>Should not run until</u>: Enter a date in the future when events using this schedule will begin to be submitted. Leave blank if this schedule is to be activated immediately.

- <u>Frequency</u>: Choose from:

  - Every 'n' minutes.

- ▪ Hourly.

- ▪ Daily.

- ▪ Weekly.

- ▪ Monthly.

- ▪ Annually.

- ▪ When email arrives.

- ▪ None (used only for events that have no schedule).

- Based on the chosen frequency enter the additional scheduling details, such as the time of day to run, the day of the week, etc.

- Allowed Range: Specify the months of the year, the days of the week, and the hours of the day when this schedule is eligible to run events. Times are inclusive.
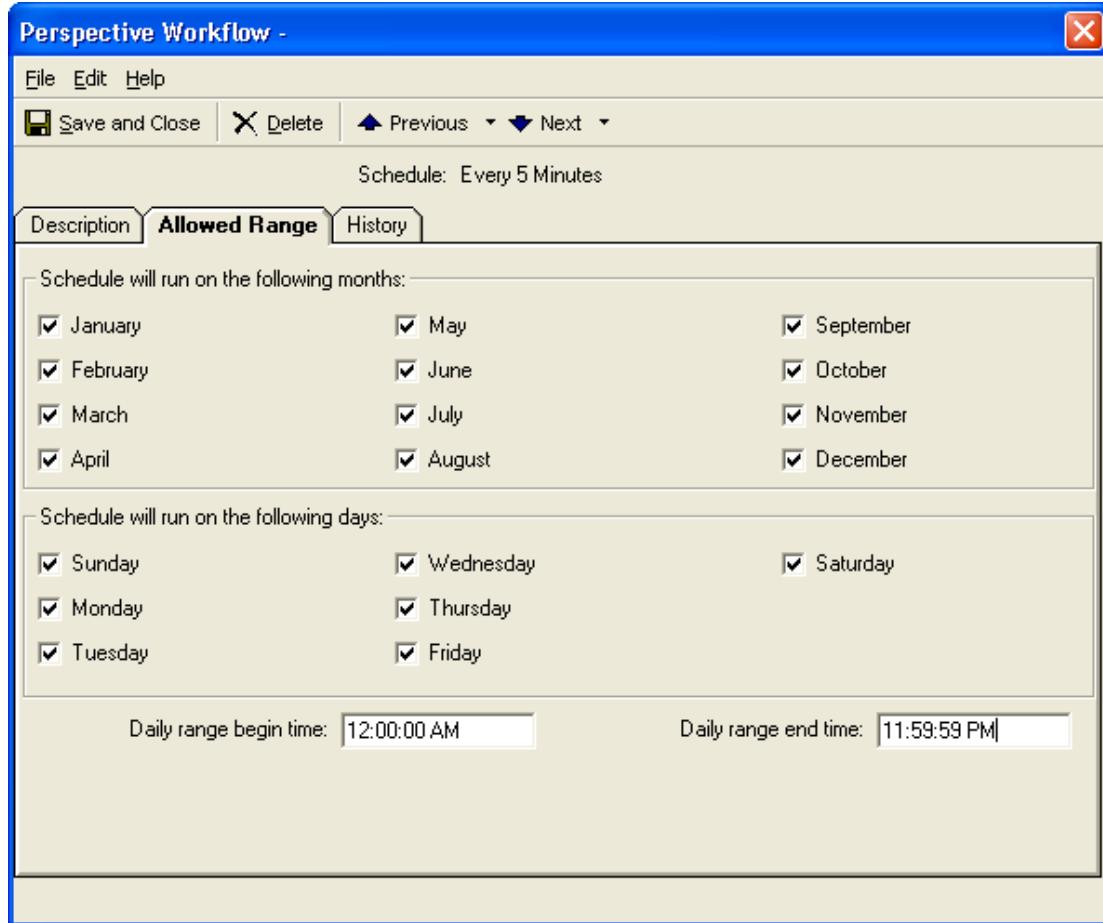
- <u>Should run on holiday</u>: Place a checkmark in this field if you <u>do</u> want an event to run on a holiday (defined in the Administrator module).

Monitoring Scheduled Events

When an event is scheduled, you can use the Monitor to track the status of the event's scheduled submission. In the Monitor, go to the "Scheduler" branch and then click on "Next Run Date/Times". You will see a list of events pending execution.

Once an event is submitted, proceed to "Application Events" and monitor whether the event has been successfully checked and/or triggered.

Event Dependencies

This function has been replaced with "Job Streams". Please refer to that section below.

Job Streams

A job stream is a series of events that need to run in a sequential fashion, one after another. Job streams have the following unique characteristics:

- There is a single schedule for all events in a stream. That schedule indicates when the first job in the stream will be submitted.

- Each event in a stream <u>completes</u> before the next event in the stream begins.

- The "completion" of an event is defined as its successful execution—<u>regardless of whether the event is triggered or not</u>.

This last point is <u>very important</u>; if a job stream has 3 events within it, all 3 events will always execute whenever the stream is run. Whether any one of those events is **triggered** is based on the query associated with the event.

Job streams are very useful in situations where you need precise control over the order of execution of multiple events; for example, when you need to have an event trigger workflow to update an application and then wish to have a report run on that updated data (two events; one job stream).

And remember—regardless of how many components an event has, alerts, reports, and/or workflow, the next job in a stream will not execute until all the components of the preceding event are complete.

Job streams are valuable when:

- You have a series of events that need to be submitted in a specific order, such as an initial event that logs a new theft incident in Perspective, and then a subsequent event that triggers alerts about that particular incident record.

- You have a group of events related to the same business condition, such as a "new case". Job streams are an excellent way to group related events together, and easily manage them.

- You have a business process with decision branching, e.g., a stream that triggers alerts based on the access level of an incident or case.

  In this example, a stream could contain two events; one event that triggers alerts for incidents and cases with an access level of 3 and under, and another event that triggers (different) alerts for incidents and cases with an access level of 4 and above. For any incident or case, <u>both</u> events will always run, but only <u>one</u> event will ever trigger.

Add/Edit a Job Stream

To create a job stream, open the Navigator, right-click on the "Job Streams" branch and select "New Job Stream". To edit an existing job stream, expand the Job Streams branch and double-click on the stream you wish to edit.

You may view/edit individual events in a job stream using the same functions as were detailed earlier in this chapter. The following options are available to you:

- Job Stream Name: The name that uniquely identifies the job stream.

- Schedule: Click on the List button and choose a schedule. It is suggested that events used within a stream have a schedule of none.

Selecting Events for a Job Stream

To add an event to a job stream, follow these steps:

1. In "Applications to Select", single-click on the application that contains the event you wish to add to the stream and you will see a list of all active events for that application.

2. Double-click on the event you wish to add.

3. Repeat steps #1 and #2 for each event you wish to add to the stream.

4. Click on "Save and Close" when done.

Re-Ordering/ Removing Events in a Job Stream

To change the order of (or remove) events in a stream:

1. Open the job stream to edit its configuration.

2. Highlight the event whose order of execution you wish to modify (or wish to delete from the stream).

3. Use the "Move Up" and "Move Down" buttons to change the order; use the "Remove" button to delete the corresponding event.

4. Click on "Save and Close" when done.

Delete a Job Stream

Expand the "Job Streams" branch and locate the job stream you wish to remove. Right-click on that job stream and select the option called "Delete Job Stream".

Run a Stream Right Now

Expand the "Job Streams" branch, locate the stream you wish to run, right-click on that job stream and select the option called "Schedule This Job Stream Now".

The Tracking Tab

The "Tracking" tab shows you whether an event has been checked, whether it has been triggered, and what the "unique" IDs of the triggered records are. This tab also lets you "un-trigger" (or "remove tracked items") for an event.

To access the Tracking tab, double-click on the event name and click on the "Tracking" tab.
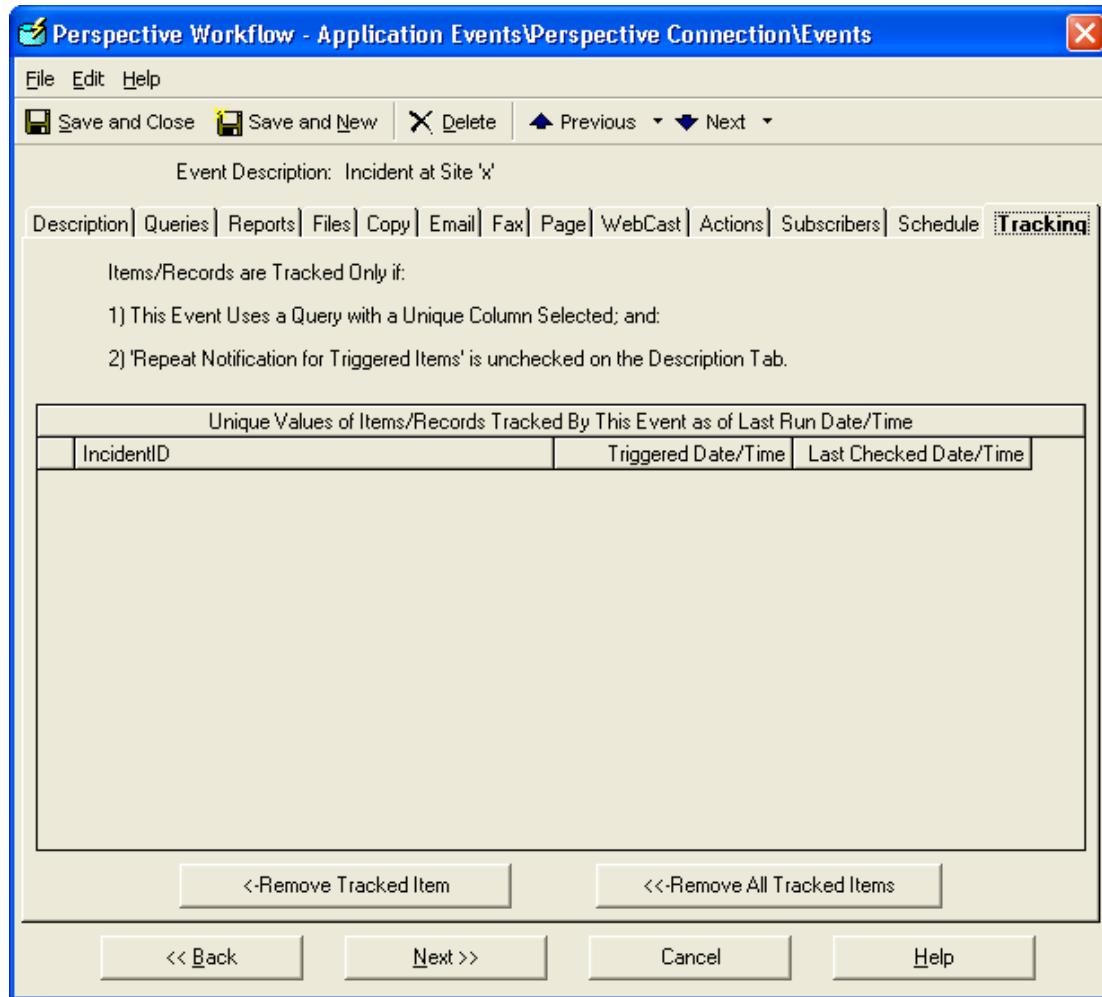
From this tab you can "un-trigger" (or clear out) the triggered records for an event and thus enable it to be triggered again. You can clear out some or all triggered records for an event.

Clearing Triggered Records

To un-trigger a specific record for an event, highlight the record and click on the "Remove Tracked Item" button. To clear all triggered records for an event, click on the "Remove All Tracked Items" button.

(You may need to click off and back onto the "Triggered" tab to see that triggered items have been removed.)

If Your Event Isn't Triggering

If your event isn't triggering, check the Monitor and see if the event appears under "Application Events" that are "pending", "checked", "triggered", or have recorded "errors".

Here are the top reasons why an event may run but not trigger:

1. The event's conditions are not met. Preview the query to ensure that there are matching records (and note that if the query checks for "changed records", preview will show all records, regardless of a change to their value).

2. The event is already triggered. Go into the "Triggered" tab and see if any triggered records are listed.

3. The email sending account is blank. Go to the "Email" tab and make sure that the "account to send from" has a valid value.

4. There is no alert message text. If you've chosen to send alerts via email but have not specified any message text, no alert will be sent out.

5. The subscriber does not have a valid delivery address. Review the subscriber's profile to see they have a valid address for the chosen method.

6. The subscriber is disabled to receive alerts at that day or time. Review their profile to see if their "work hours" exclude certain days or times.

7. The corresponding delivery server is disabled. If an event is configured to send fax alerts but the fax server is disabled, no alerts will go out.

8. The event is waiting for its report to finish. If an event has an associated report, it may be configured to "wait" until the report is done before sending its alert.

If Your Event Triggers Over and Over

If your event triggers over and over, check out the event query's "unique" value. If a query doesn't have a unique, the event will trigger repeatedly for the same record, until that record no longer meets the query's criteria.

Also check the setting of the event's "Repeat Notification for Triggered Items" checkbox and make sure it is not checked.

Run an Event Right Now

To run an event once—right now—right-click on the event and choose "Schedule This Event Now". The Perspective Workflow Windows Service or Desktop Service must be running to use this option, but do not run <u>both</u> services simultaneously.

Test an Event

To test an event—that is, <u>not run</u> the event but rather get an informational display of what would happen when the event runs—right-click on the event and choose "Test This Event Now". The Perspective Workflow Windows Service or Desktop Service must be running to use this option, but do not run <u>both</u> services simultaneously.

Monitoring Events

Two modules in Perspective Workflow let you track the status of events; the Navigator and the Monitor. The Navigator gives you a quick overview of what events are scheduled to run, are running, and whether any errors have been encountered; the Monitor provides a comprehensive audit trail of everything that's going on in the Perspective Workflow application.

Using the Monitor, you can keep track of:

- The status of the application's servers.

- Events that are scheduled to be checked and have been triggered.

- Alerts that are queued to be delivered, and have been delivered.

- The text of the outgoing alert messages.

- The status of forms, documents, and reports queued for delivery.

- The status of workflow actions queued for execution.

- The status of any system errors.

The Monitor is an informational display; you cannot use it to modify the information that appears within it.

Monitoring in the Navigator

Scheduled Events

The "Scheduled" branch shows the next scheduled times that events are due to run; this is the same information as the Monitor "Scheduler / Next Run Dates/Times". The Navigator displays events first according to their schedule and then by application, whereas the Monitor lists them in chronological order.

In Progress Events

The "In Progress" branch shows those events that are currently being executed; this is the same information as the Monitor "Pending" options, such as pending application events, email messages, reports, and so on.

The Navigator provides you with a count of the number of items that are pending in each category and displays matching records sorted by the application to which the pending items belong. Note that the Navigator will not show any pending items for servers that are not currently running.

Event Exceptions

The "Exceptions" branch shows those events that have experienced errors; this is the same information as the Monitor "Errors" options, such as application event errors, email errors, report errors, and so on.

When you expand an Exception branch, you will see a list of exception (error) types, followed by the names of the applications in which the errors occurred. Expanding the application branches show you the specific errors that happened. You will not see any exceptions for servers that are not currently running.

To view, correct, delete, or manually "complete" an event error, please refer to the option called "Corrective Actions", located in the Administrator module.

The Monitor

When you log into the Monitor module, the following window appears:
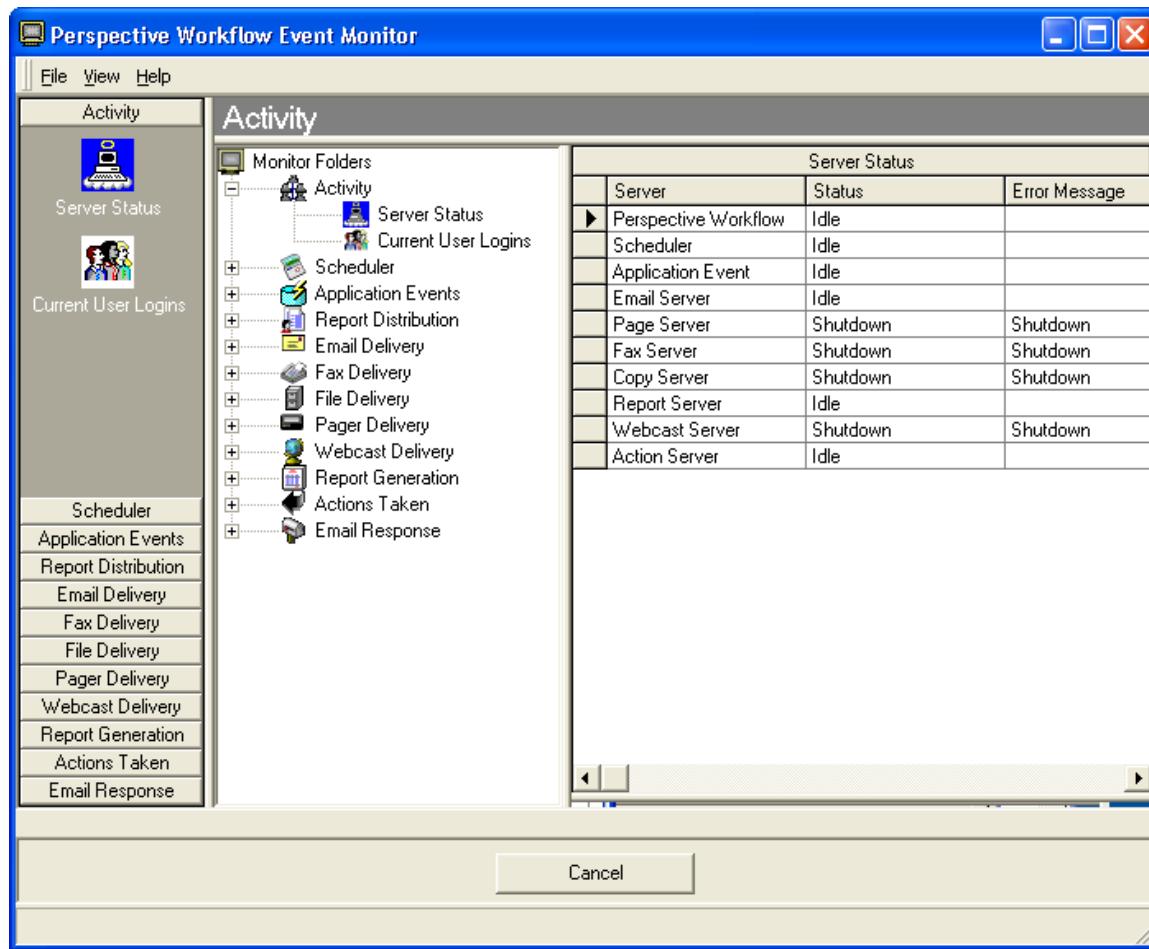
You can control the order in which records are displayed by clicking in the heading for any field in the Monitor window.

Activity Folder

The Activity folder tells you about current processing and user activity occurring within the application.

Server Status

This displays the current status of the application's servers. Possible statuses are:

- Shutdown: The server is not running at this time. This could be due to the application service not running, the individual server being disabled (in the Administrator), or an error that caused the shutdown of the server.

By default, all servers are enabled except for the Paging, Faxing, Reporting, Copying, Webcasting & Action servers.

- Idle: The server is running but is not processing any data.

- Processing: The server is processing data.

- Startup: The server is starting up. Startup mode should not last for more than a few seconds; if it does, try re-starting the application's service.

- Linking: Subscriber linking (see "Subscribers" chapter) is in progress.

Server Descriptions

Perspective Workflow uses the following servers:

- Perspective Workflow: This server initiates all of the other servers.

- Scheduler: This server schedules events, alerts, reports, and workflow.

- Application Event: This server executes events.

- Report: This server generates Crystal Reports, forms, and documents.

- Email: This server delivers email messages.

- Fax: This server delivers fax messages.

- Page: This server delivers pager messages.

- Webcast: This server delivers dashboard (Webcast) messages.

- Copy: This server copies and delivers files and reports via FTP.

- Action: This server executes workflow.

Server Notes

- If any of the first three servers are shutdown or paused, you will not be able to check for events, send alerts, generate reports, or execute workflow.

- If any of the notification servers (i.e., email, fax, pager, copy, or Webcast) are shutdown or paused, you will not be able to send alerts via that means.

- If the "Action" server is shutdown, you will not be able to execute workflow.

Current User Logins

This option tells you who is logged into Perspective Workflow, including the module they are logged into as well as their name and date/time of most recent activity.

Scheduler

The "Scheduler" folder has one branch within it—"Next Run Date/Times"—and this shows you what events are due to be submitted next.
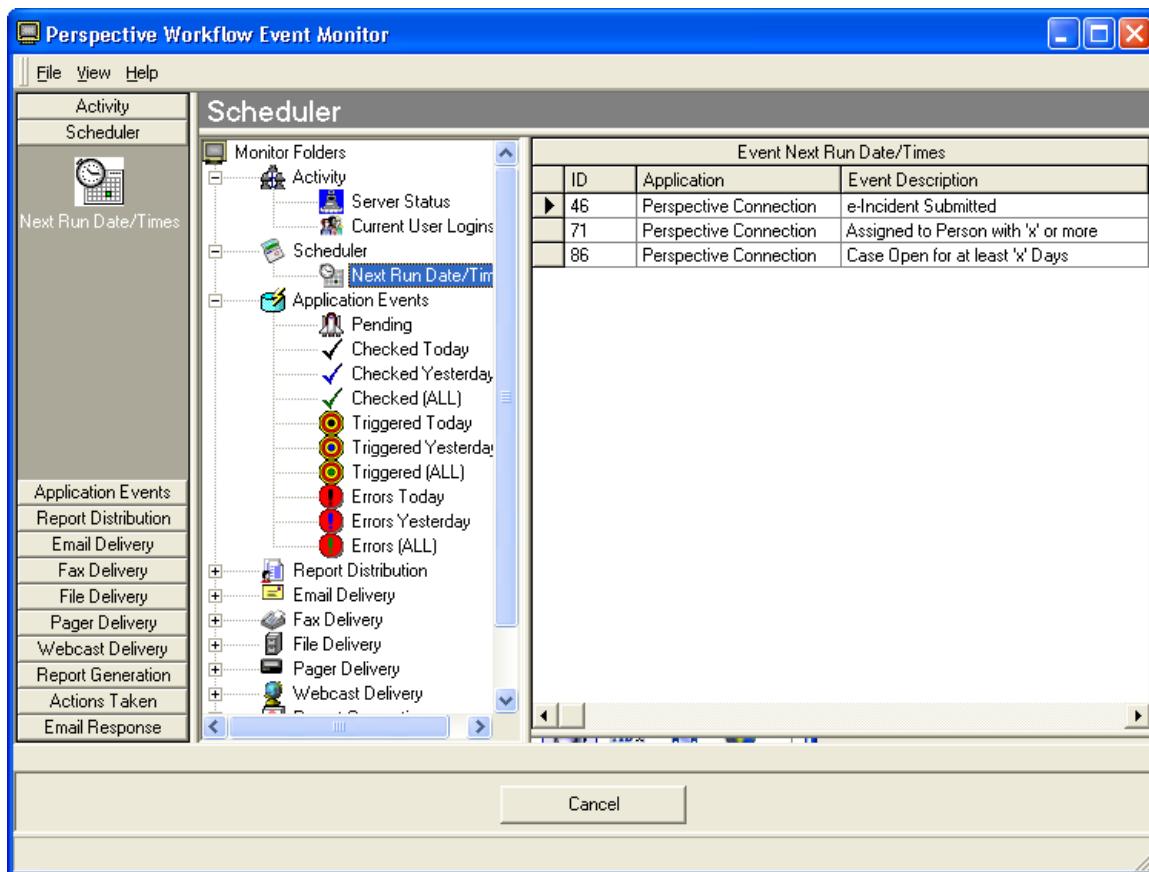
For each event you will see its name and application, next scheduled run date/time, and the event's schedule frequency.

Application Events

The "Application Events" folder lets you to track the status of events that are due to run, have already run, or have failed to run successfully because of an error.
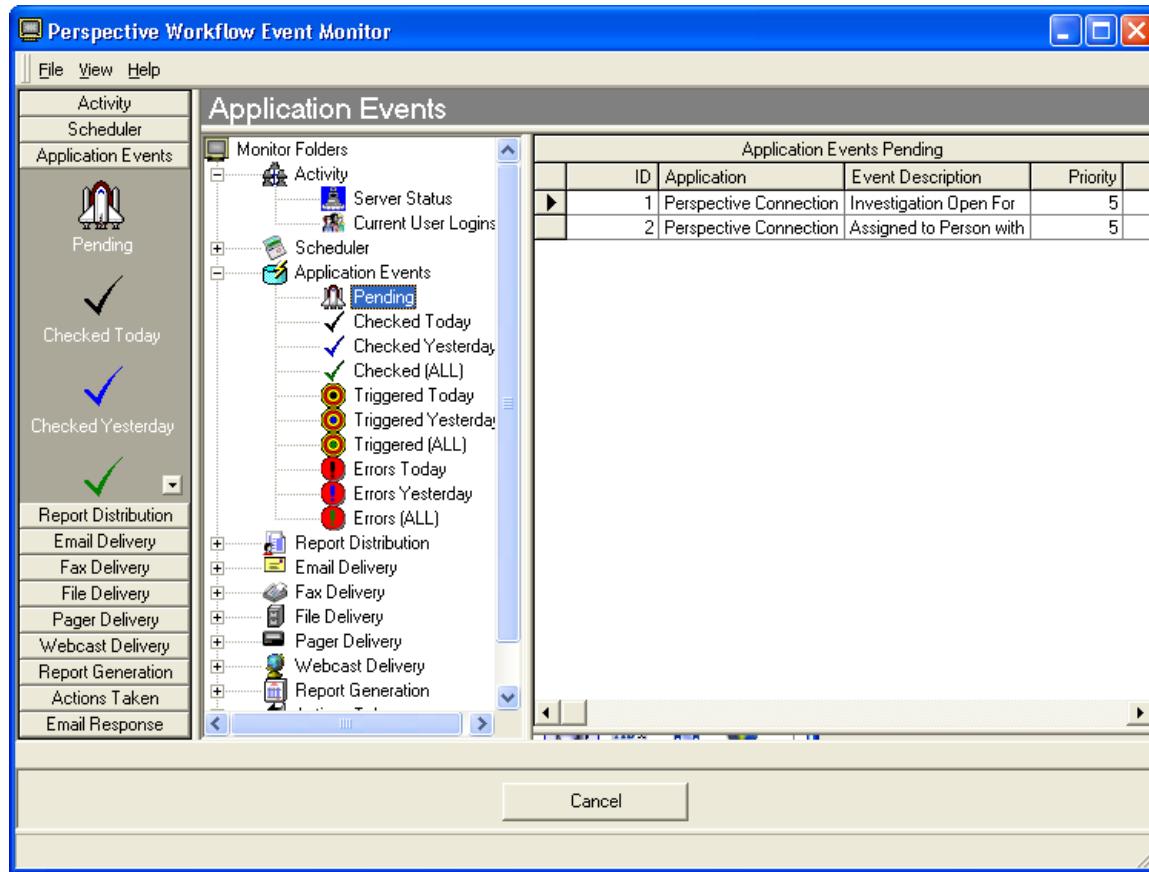
Application events are divided into four categories:

- Pending: An event is pending because it either has not been submitted, or is in an error state.

- Checked: A checked event is one that was successfully executed. It may or may not be "triggered", depending on whether its conditions were met.

- Triggered: A triggered event is one that was successfully executed and whose conditions were met. A single run of an event may result in multiple triggered records.

- Errors: An event shows up under "errors" if it was unable to be successfully checked. Such an event automatically is re-queued under "Pending".

Triggered Records

When an event successfully runs, it will appear once in the "Checked" branch but may appear multiple times in the "Triggered" branch. Consider the following event:

Send an alert to each Assigned By Person who created assignments that are due within the next three days.

There may be multiple records that meet this event's criteria and the event may trigger once for each record (assignment), once for all records (assignments), or once per user (Assigned To Person) who has assignments due within the next three days.

Event Details

For each checked event, you will see the event's application, name, date/time of execution, and processor seconds that the event took to complete.

For each triggered event, you will see the above details plus the alert message text and the value of the unique ID of the triggered record.

For an event that ends in error, you will see the event's application, name, date/time of execution, as well as the number and description of the error that occurred.

Displaying Alert Message Text

The columns that contain alert message text may be expanded to display the full text of the message. To do so, point your cursor at that field and the Monitor will automatically pop-up a window that shows you this content.
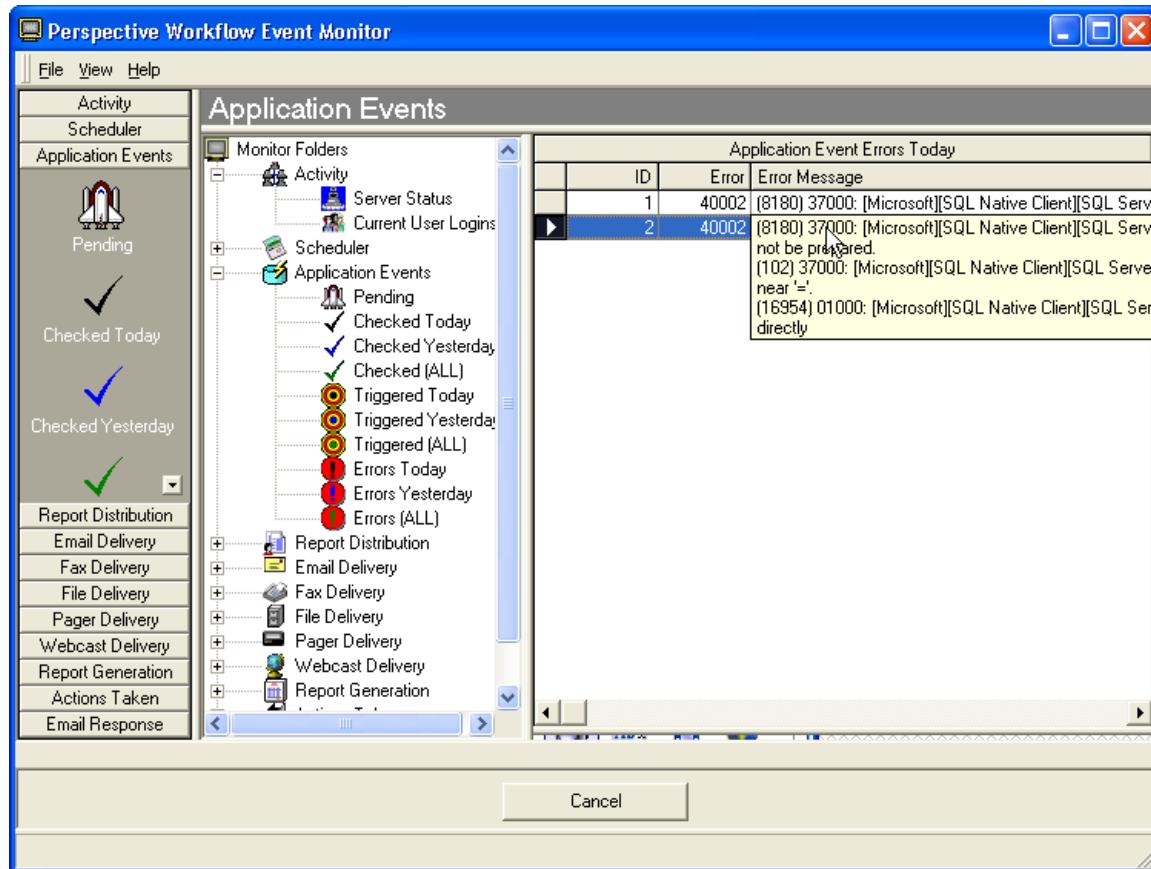
Displaying the Status of Alerts, Reports & Workflow

When an event triggers, it can cause any combination of alerts, reports, and workflow to be executed. The "Deliverables" button shows you the status of these items.

To use this function, click on any of the Application Events "Triggered" branches, select the event you are interested in, and click on the Deliverables button. The following window will appear:
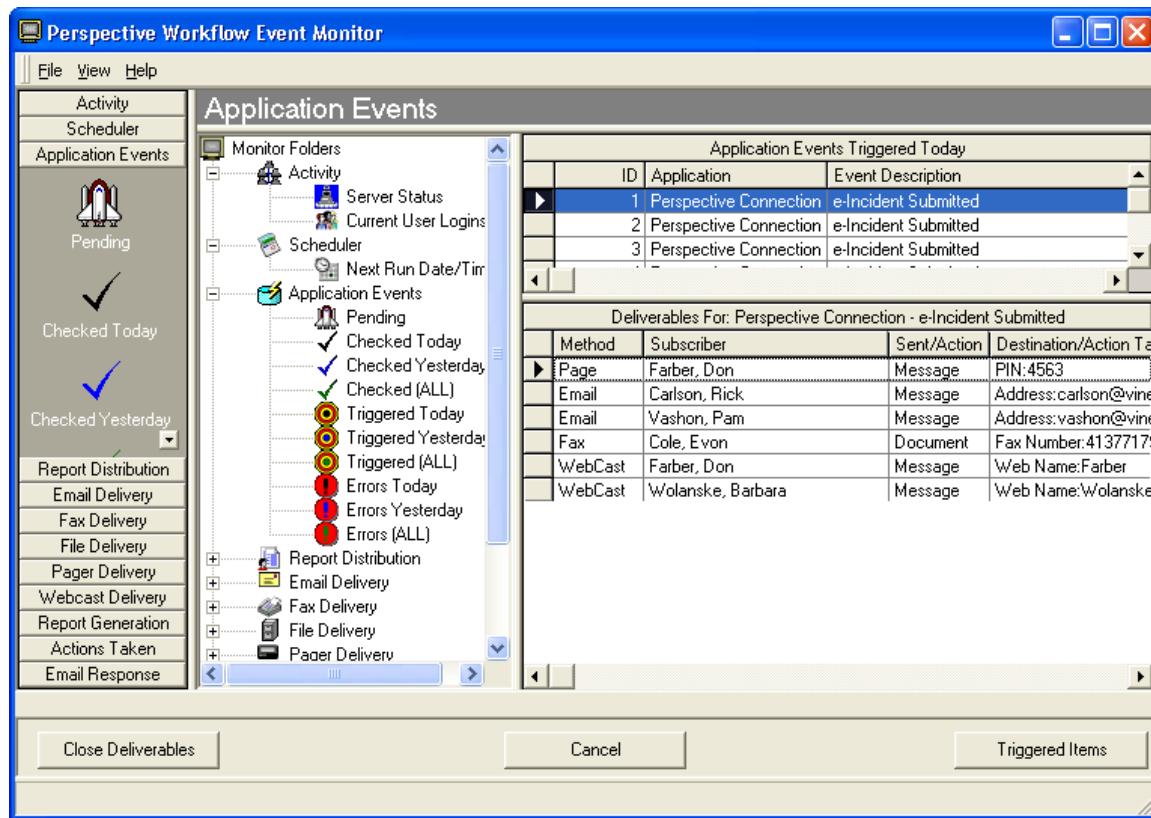
You are shown the status of any alerts, reports, or workflow associated with the event that was triggered, including the completion status of these items, the delivery addresses, and the date/time each deliverable was completed.

Listing an Event's Triggered Records

If an event is configured to track the unique ID of records that meet the event's criteria, the Monitor can be used to display these values. This is referred to as an event's "triggered items".

Note that a triggered event may have either one or multiple triggered items, based on how the event is configured.

To use this function, click on any of the Application Events "Triggered" branches, select the event you are interested in, and click on the Triggered Items button. The following window will appear:
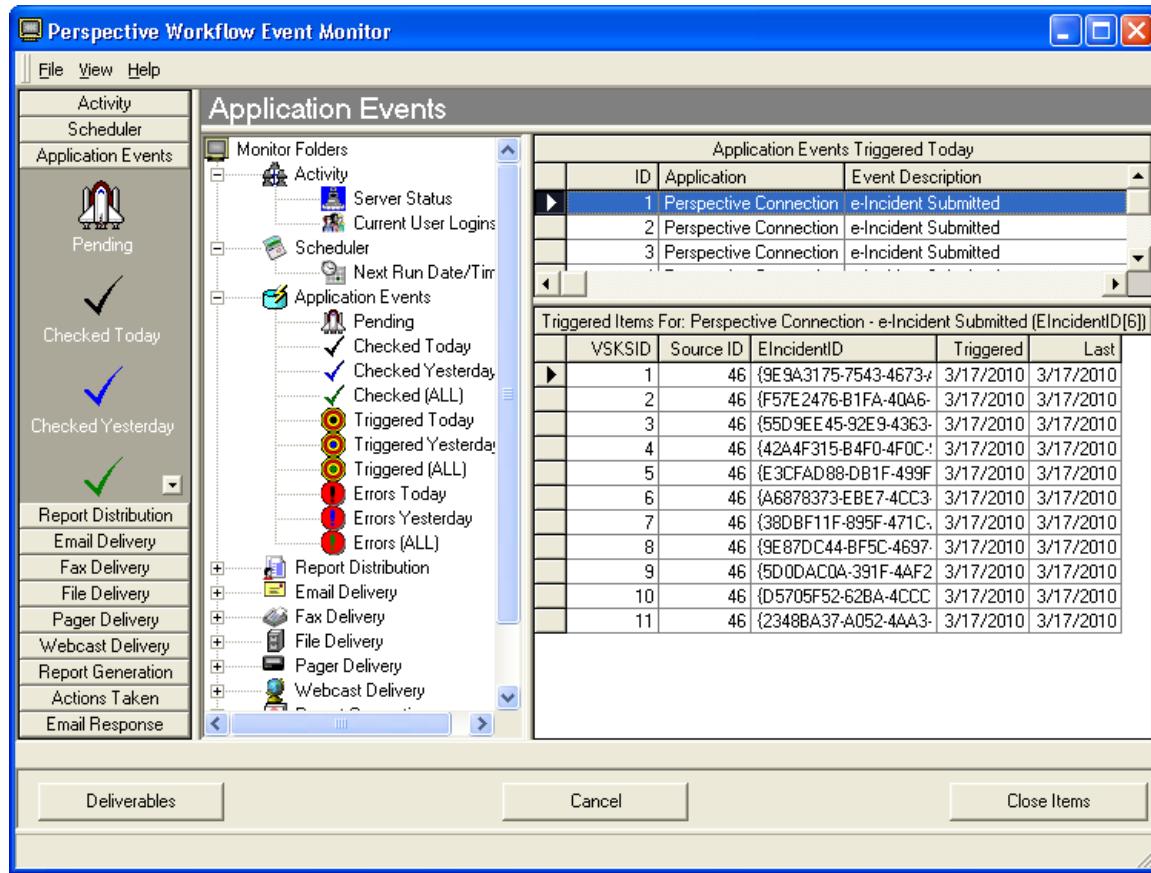
You will not have access to an event's triggered items if:

- The event's query does not have a "unique" column identified, or;

- The event is configured to "repeat notifications for triggered events".

How to Handle Event Errors

When an event fails because of an error, three things happen:

- The event will appear in the "Errors" branch.

- The event will appear in the "Pending" branch.

- Perspective Workflow will re-submit the event every minute until it either runs successfully, or is deleted or manually completed (via the Administrator).

Perspective Workflow retains only one iteration of an event that errors. If an event errors due to a condition that corrects itself (such as a server down), you can leave the event alone as once the condition is corrected, the event will successfully execute.

If the event errors because of an incorrect configuration, you can edit the event, correct it, and your "fixed" version will be used the next time the event runs.

If the event errors and you wish to remove that run of the event, go to the Administrator and either delete or manually complete the record.

You may also use the Administrator option to remove "pending" items from the Perspective Workflow database. Go to the "File" menu, select "Database Tools," and then "Remove Pending Items."

Report Distribution

Report Distribution pertains to reports that are scheduled for periodic generation and distribution. This does not include to reports that are associated with application events (see "Report Generation").

There are two sub-branches of this folder ("Pending" and "Submitted"); you will see the name of scheduled report events (e.g., "Weekly Management Reports") and the date and time the events are to be submitted.

To track the completion status of the individual reports within a distribution event, go to the "Report Generation" branch.

Email, Fax, Pager & Webcast Delivery

The "Delivery" folders for email, fax, pager, and Webcast (dashboard) are divided into three branches:

- Pending: A pending message is one that has not been sent either because of system processing or because of an error.

- Sent: A "sent" message is one that was successfully delivered. An "undeliverable" email message may be considered successful because the delivery did succeed (even though the recipient was invalid).

- Errors: A message will show up under "errors" if it could not be sent. An erroring alert will automatically be placed back into the "Pending" branch.

How to Handle Delivery Errors

When a message fails to be delivered successfully, three things happen:

- The message will appear in the "Errors" branch.

- The message will appear in the "Pending" branch.

- Perspective Workflow will attempt to re-send the message every minute until it is either successfully delivered or is deleted or manually completed (in the Administrator).

To remove all pending items for a delivery method, open the Administrator, go to the "File" menu, select "Database Tools," and select "Remove Pending Items." You may then select the option to remove all messages that are pending.

Report Generation

The "Report Generation" folder lets you track the status of forms, documents, and reports that an event is generating. This folder is divided into three branches:

- Pending: A pending report is one that has not been generated either because of system processing, or because of an error.

- Generated: A "generated" report is one that was successfully produced. Just because a report was "generated", it does not mean it was successfully delivered. Review the appropriate delivery method (such as email) to see if the report was delivered to its intended recipients.

- Errors: A report will show up under the "errors" branch if it failed to be generated successfully. A report that fails will automatically be placed back into the "Pending" branch.

How to Handle Report Generation Errors

Report generation errors can occur for a number of reasons, typically an error in the report's design. When a report fails to be generated successfully, three things happen:

- The report will appear in the "Errors" branch.

- The report will be re-queued under the "Pending" branch.

- Perspective Workflow will attempt to re-generate the report every minute until it either succeeds or the report is deleted or manually completed (in the Administrator).

To delete or manually complete a report, open the Administrator, go to the "File" menu, select "Database Tools," and then "Remove Pending Items." You may then select the option to remove all pending report generation requests.

Actions Taken (Workflow)

"Actions Taken" refers to events that execute workflow actions in response to a triggered event. This folder is divided into three branches:

- Pending: A pending action is one that has not been completed either because of system processing, or because the action failed.

- Completed: A "completed" action successfully executed.

- Errors: An action will show up under "errors" if it was unable to successfully execute. An action that fails will automatically be placed back into the "Pending" branch.

How to Handle Workflow Action Errors

Action errors occur for a number of reasons, such as a syntactical error in a Visual Basic script. Note that action errors are not recorded if an action executes successfully but returns an error status code.

When a workflow action fails, three things happen:

- The action will appear in the "Errors" branch.

- The action will appear in the "Pending" branch.

- Perspective Workflow will attempt to re-execute the action every minute until it either succeeds or is manually deleted or completed (in the Administrator).

To delete or complete a pending action, open the Administrator, go to the "File" menu, select "Database Tools," and select "Remove Pending Items." You may then select the option to remove all actions that are pending.

Email Response

(See the "Email Response System" section in the "Advanced Functionality" chapter for more details.)

The "Email Response" folder lets you see what email accounts are being checked for incoming messages, how many messages have been received and loaded into Perspective Workflow, and if any errors were encountered.

Once email messages are loaded into Perspective Workflow, the corresponding events are treated just like any other application event, and thus can be tracked using the "Application Events" folder.

The "Email Response" folder is divided into three branches:

- <u>Checked</u>: Incoming email messages that have been checked by Perspective Workflow.

- <u>Received</u>: Incoming messages that have been loaded into the Perspective Workflow email response system database.

- <u>Errors</u>: Errors that Perspective Workflow encountered while trying to check for messages sent to one or more email accounts.

Advanced Functionality

This chapter describes additional functionality available for advanced use of Perspective Workflow: Visual Basic Scripting, Email Response System, Reports and Dashboard Alerts (Webcasting). It is not necessary to use any of this functionality to run the Perspective Workflow event pak provided by PPM 2000. However, if you do wish to make use of this functionality within your Workflow implementation, please note that additional licensing may be required.

Visual Basic Scripting

Among Perspective Workflow's functions is its ability to use Visual Basic (VB) scripts to add or update information within application databases.

This module should be reserved for use only by those individuals who are familiar with VB syntax and have expertise in writing VB scripts.

The Two Types of Scripts

Perspective Workflow supports two types of scripts; "back end" and "front end":

- <u>Back-end</u> scripts are those that execute as a result of an event being triggered.

- <u>Front-end</u> scripts are those that are used instead of a query as a means to check for a business condition (e.g., such as for monitoring the event log).

Back-End Scripting Scenarios

Here are two scenarios where back-end scripting would be used:

- **Condition**:   An investigator receives a phone tip regarding an incident.
  Script: Mark the incident record as "Follow-up Required".

- **Condition**:   An employee realizes that, along with his laptop, confidential
                       company records were stolen.
  Script: Change the incident's Access Level to "Level 4".

Front-End Scripting Scenarios

Here are two scenarios where front-end scripting functions would be used:

- Check if available disk space on your database server drops below 200 MB.

- Check to see if EFT files have been received.

Create a Script

Before you create a script, go to the event that will be using the script and review its query to make sure that the query retrieves all of the data fields your script requires. If a column does not appear in the event's query, you will not have access to that column within the event's script.

To create a script, expand the "All Events" branch in the Navigator, right-click on the application you wish to add the script to and choose "New Basic Script":
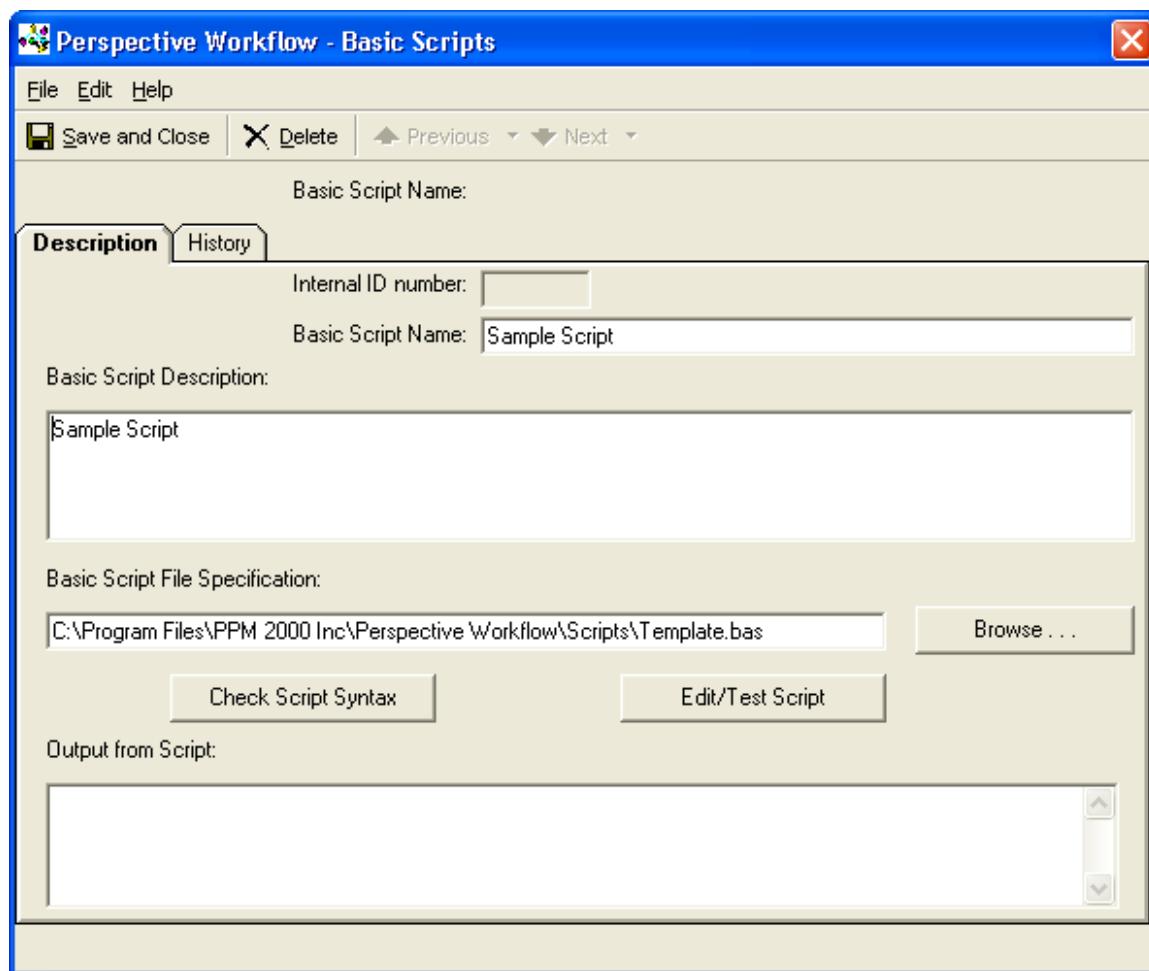
- <u>Basic Script Name</u>: Specify a brief descriptive name for the script. That name is copied into the Basic Script Description field, in which you may enter a more detailed description.

- <u>Basic Script File Definition</u>: By default, scripts are stored in the "Scripts" directory where the application is installed, but you may override this location.

The "Edit/Test Script" button lets you edit and modify the script's contents as well as run the script from the edit window. The "Check Script Syntax" button lets you run a process that checks your script for any syntax errors. When you run this, you will be informed whether your script has any errors.

Back-End Script

When you edit a script, have a list of the <u>customized names</u> of the fields of data from the query the event is using.

Once you click on "Edit/Test Script", you will be presented with a script template that begins with an area for script author details and general purpose overview as shown in the following example:

```
' Script Name        : ERP_Update.bas
' Script Author      : John Smith
' Script Purpose     : Supervisor update in ERP
' Script Creation Date : 2/5/2010
'
'
' The following declared functions are available
' to the script author in order to interact
' more closely with Perspective Workflow. All are optional
'
' Scripts may be executed by Perspective Workflow in two ways.
'
' 1) As an action to a triggered event.
'
' 2) In place of a query in order to have the script
'    trigger events.
'
' A script used as an action cannot trigger events.
```

<u>Using General Event Data in a Script</u>

Beyond the initial comments, the first important part of a script details the VB functions that you can use to retrieve such information as the name of the event, its application, ODBC source name, API connection information, and the names of any reports or files associated with the event. This information is contained in the following section:

```
' The following functions are used when a script is executed
' as an action.
'
Declare Function KSGetEvent App ( ByVal s As String ) As String
'
' This function retrieves specific data about the event that
' has triggered.
'
' The available values that can be passed to KSGetEvent in
' order to retrieve data are as follows:
'
' lookup      The event's lookup key
'
' application        The event's application
' description        The description of the event
' id                 The id of the event
' dns                The ODBC data source for the application
' username           The ODBC username
' password           The ODBC password
' apiname            The API name as set in the connection
' apiusername        The API username set in the connection
' apipassword        The API password set in the connection
' report pending     The number of reports for the event
' report files       Comma separated list of report output files
' existing files     Comma separated list of files (Files tab)
```

Using Alert Message Text in a Script

The next part of a script details the VB functions that you can use to retrieve the alert message texts that are associated with the event.

This information is contained in the following section:

```
'
Declare Function KSGetPackage App ( ByVal s As String ) As String
'
' This function retrieves data about the package that was
' created for delivery by Perspective Workflow. The values that
' can be passed to KSGetEvent in order to
' retrieve data are as follows:
'
' email subject      The email subject
' email message      The email message text
' page message       The pager message text
' fax subject        The fax subject
' fax message        The fax message text
' fax comments       The fax comments
' webcast subject    The webcast subject
' webcast message    The webcast message text
```

Using Query SQL in a Script

The next section of a script details how to retrieve the SQL syntax of the query associated with the event. This information is contained in the following section:

```
Declare Function KSGetSQL App ( ByVal l As Long ) As String
'
' This function retrieves the SQL from the query that was used
' to trigger the event.
' You pass a number of the query used.
' For example if the event has only one (1)
' query, then you would pass the number 1
' Example: mysql=ksgetsql(1)
' retrieves the sql from the first query
'
```

Accessing Data Field Values in a Script

The next section of a script details how to access the values of data fields retrieved by the event's query. This information is contained in the following section:

```
Declare Function KSGetData App ( ByVal s As String ) As String
'
' This function retrieves columns of data from the queries
' that triggered the event. You pass the customized
' column name as defined in the query builder to
' retrieve that information.
' Example: print ksgetdata("companyname") ' prints
' company name from the query data
'
```

Running Events from a Script

The next section details how a script can call for the execution of one or more other events. This information is contained in the following section:

```
Declare Function KSScheduleEvent App ( ByVal lookup As String) As
String
'
' This function immediately schedules the event matching the
'lookup string on the description Tab of the Event Manager.
'
' The parameters are as follows:
'
' lookup
' The lookup string that uniquely identifies the Event in the '
' Event Manager
'          Returns a string error message if unable to schedule
```

```
'               event. Returns empty string if Event is scheduled.
'
```

Set Script Return Status Code

The next section of a script details how to set the completion ("return") status code of an event that fails to run successfully.

```
Global KSReturnStatus As Long
'
' Set this value if you want to return an error status number.
' If you don't set this value, then the script is assumed to
' have worked successfully and is stamped completed by KS.
'
Global KSReturnMessage As String
'
' Set this value if you want to return an error message
'
Global KSReturnComplete as long
'
' Set this value to -1 if you want the script to complete even
' if there's an error. Normally, when scripts error, the
' Action server will attempt to execute them again in 1 minute
' until they complete without error.
'
On Error Resume Next
'
' Tell KS how things went by setting the return status
' Set this to a non-zero if there was an error. This will be
' Seen in the monitor in the errors section or corrective
' actions in the administrator

KSReturnStatus = 0

' Set return message string. Place error message in this
' variable if there was one, This will show up in the monitor

KSReturnMessage = "Success"
```

Specifying Your Script Syntax

Enter the syntax of your script between the lines that read:

```
' Begin your script here




' End of your script is here

End
```

<u>Link Script to an Event</u>

To link a script to an event, follow these steps:

1.   In the Navigator, locate the event you wish to link the script to.

2.   Double-click on the event name and then click on the "Actions" tab.

3.   Click on the "Run Basic Script" tab.

4.   Click in the "Basic Script Name" field.

5.   Click on the List button and choose the script you wish to link to the event.

The resulting event should appear like the following:
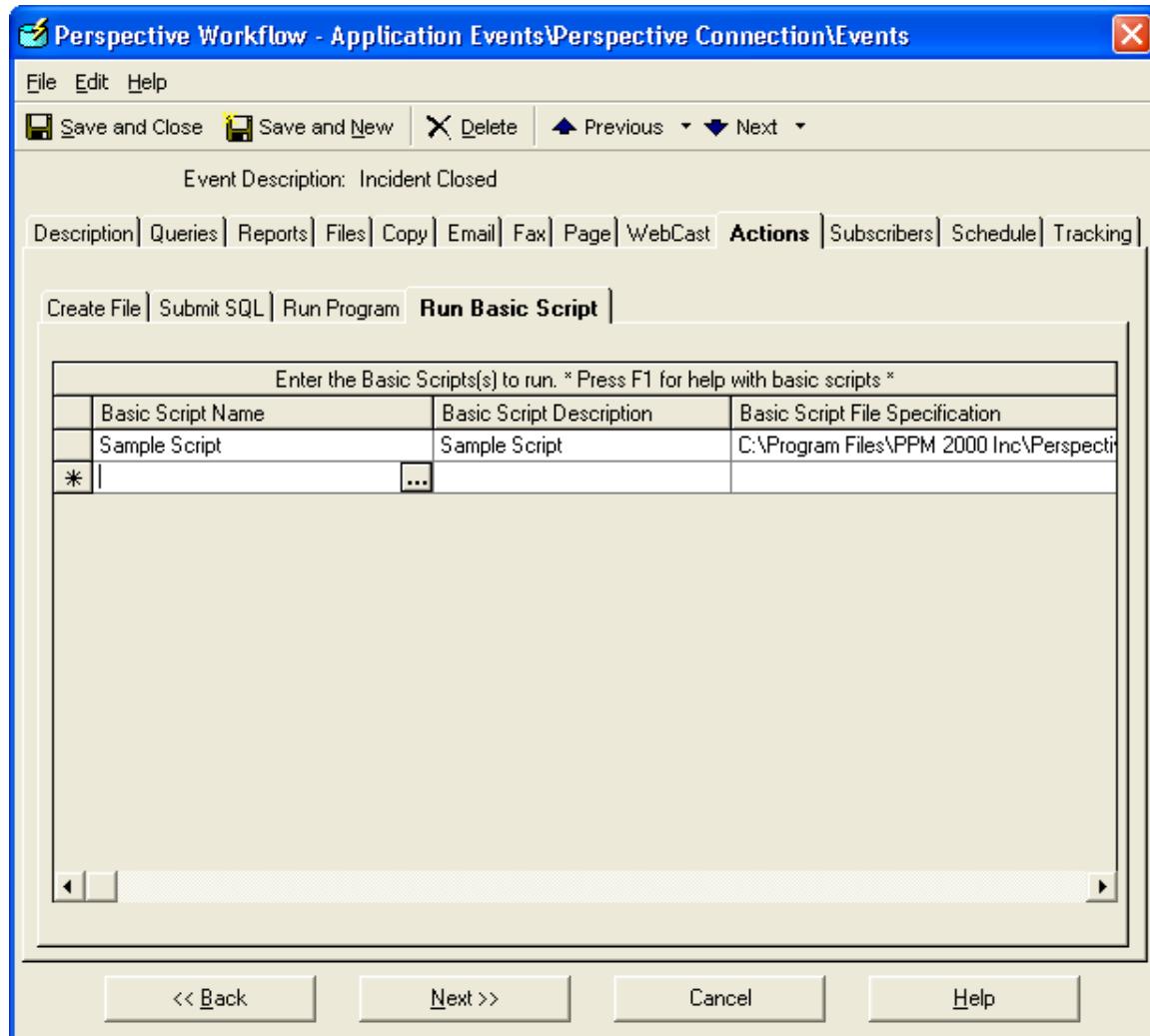
Editing/Removing an Event's Script

To edit or remove a script from an event, follow these steps:

1. Locate the event with the script you wish to work with.

2. To edit the script's contents, right-click on the script and choose "Edit".

3. To remove the script, double-click on the script, click on the arrow to the left of the script name (to highlight the selected script) and press your "Delete" key. Confirm your deletion and press the "Save" button.

Front-End Script

A front-end script contains instructions to check for a specific condition of data and then identify those elements of data that need to be passed into an event. (A single script can not be used in both front-end and back-end scripting.)

When designing a front-end script, identify how the script will be used. If the script is associated with an application, create that script within the "Basic Scripts" branch of that application.
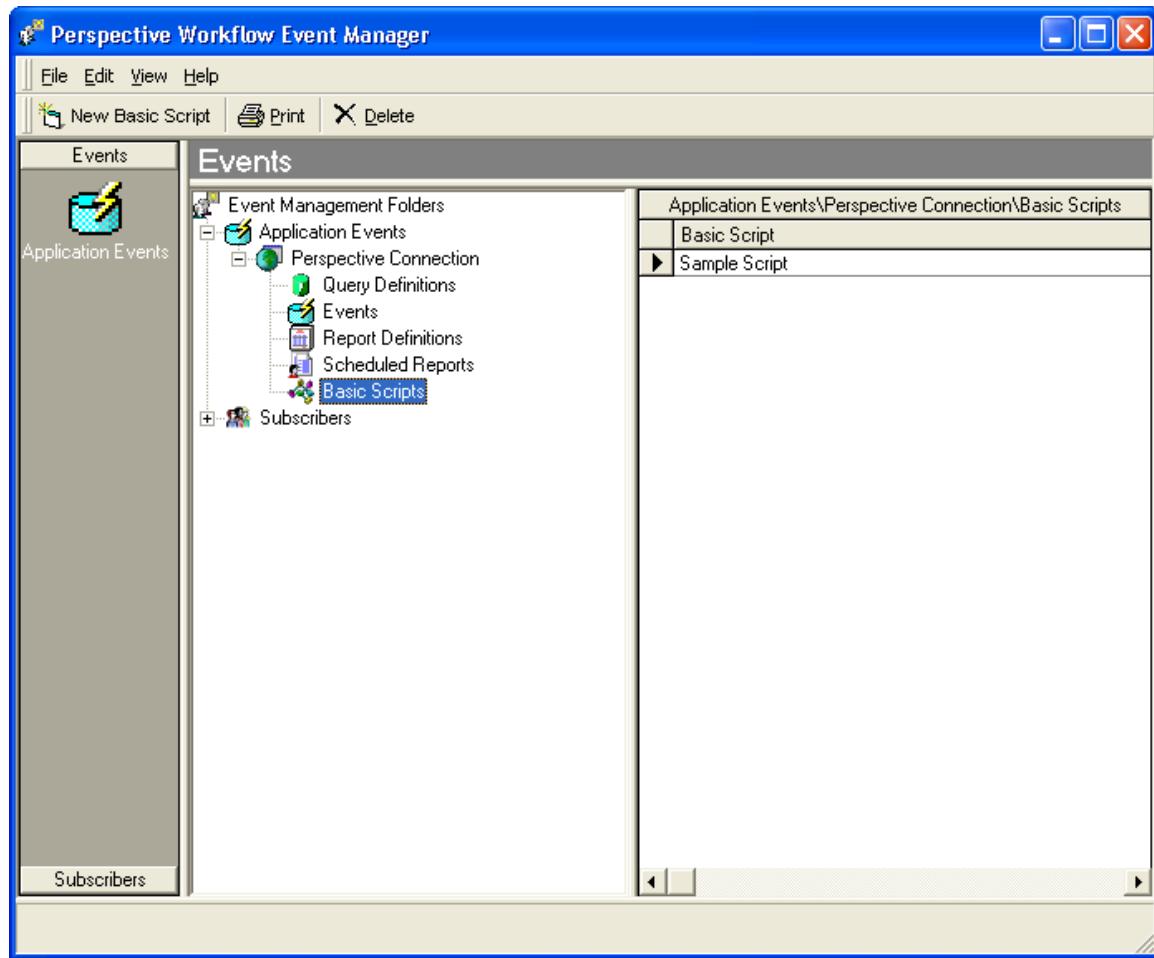
However, if a script is not related to an application (e.g., if it monitors the operating system), you might create an entirely new application and store that script there.

A front-end script can perform whatever sort of checking you need it to—monitoring the status of hardware devices, checking the revision dates of files, scanning for critical processes that must be running, or retrieving data from a database that is not ODBC-compliant.

Script Description

The first part of a front-end script is where you specify the purpose of the script and other general information:

```
' Script Name        : vs_sample_diskspace.bas
' Script Author      : John Smith
' Script Purpose     : Check available disk space
' Script Creation Date : 2/20/2010
'
'
' The following declared functions are available
' to the script author in order to interact
' more closely with Perspective Workflow. All are optional
'
' Scripts may be executed by Perspective Workflow in two ways.
'
' 1) As an action to a triggered event.
'
' 2) In place of a query in order to have the script
'    trigger events.
'
' A script used as an action cannot trigger events.
'
```

Designing a Script to Trigger an Event

The next part of a front-end script is where you indicate that the script will be used to trigger an event, and where you can store the "triggered items" for the event:

```
' The following function is used to trigger events
'
' Scripts used to take action cannot trigger events.
' Only scripts used instead of queries can trigger events.
' Please see the Event Manager
' help file while on the QUERIES tab.
'
Declare Function KSTrigger( ByVal ukey As String) As Boolean
'
' This function triggers the event in the Application Server.
' This function is called when the script is used instead of a
' query and you want to trigger an event.
'
' The parameters are as follows:
'
' ukey  The data that uniquely identifies this triggered item.
'       Passed as a string. You may pass an empty string if
'       you do not want KS to track triggered items.
'
```

Front-End Script Completion Status Codes

The next part of a front-end script is where you set the "return" status code that indicates whether the script completed successfully:

```
Global KSReturnStatus As Long
'
' Set this value if you want to return an error status number.
' If you don't set this value, the script is assumed to have
' worked successfully and is stamped completed by KS.
'
Global KSReturnMessage As String
'
' Set this value if you want to return an error message
'
Global KSReturnComplete as long
'
' Set this to -1 if you want the script to complete even if
' there is an error. Normally, when scripts error, the Action '
' server will attempt to execute them again in 1 minute until
' they complete without error.
'
On Error Resume Next
'
' Tell KS how things went by setting the return status
' Set this to a non-zero if there was an error. This will be
' seen in the monitor in the errors section or corrective
' actions in the administrator

KSReturnStatus = 0

' Set return message string. Place error message in this
' variable if there was one, This will show up in the monitor

KSReturnMessage = "Success"
```

Script Syntax

The final part of a front-end script is where you specify the syntax of the script itself.

```
' Begin your script here



' End of your script is here

End
```

Link the Script to an Event

To link a front-end script to an event, open the corresponding event and navigate to the "Queries" tab. In the middle of this tab is a check box called "Use Script Instead of Query." Place a

checkmark in this box and then click on "Select Script" to display a list of scripts that you can choose from.

(Be certain to choose a front-end script and not a back-end script.)
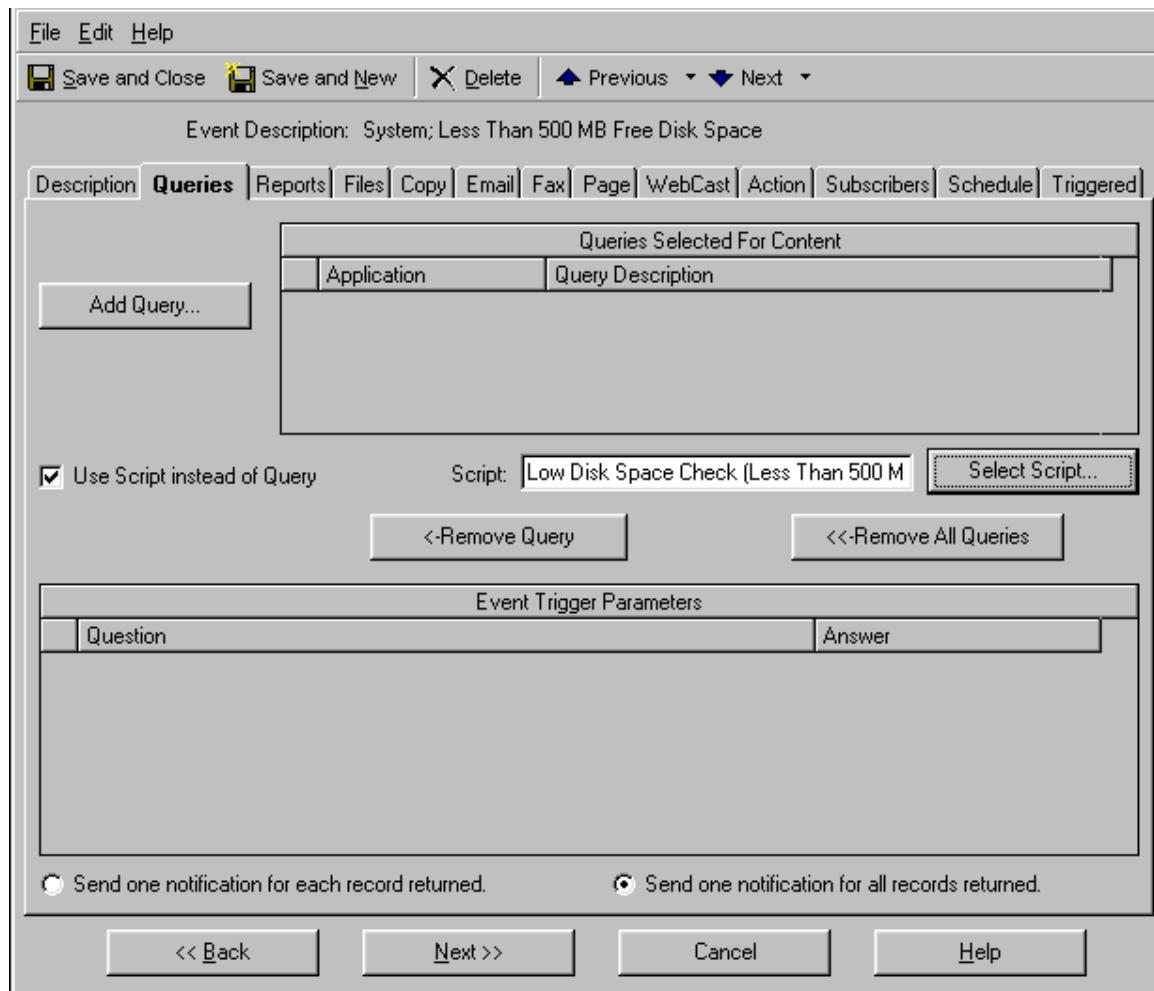
With this step you are finished with the set-up of an event that uses a front-end script.

Email Response System

The Email Response System ("ERS") lets you monitor incoming email messages in much the same way that you can monitor application database records.

If an email message meets certain criteria, you can:

- Re-route the message to specific recipients.

- Notify people about the message.

- Auto-reply to the sender.

- Use the contents of the message to add or update information in an underlying database.

ERS refers specifically to the ability to monitor <u>incoming</u> messages and respond to them; if your interest is only in sending <u>outgoing</u> alert messages via email, you do not need to use the ERS.

Authentication is not supported in ERS.

If you have been using Perspective Workflow under Microsoft Access, you do <u>not</u> have to reconfigure any ERS events to work under SQL Server.

ERS and Web Forms

ERS can monitor email messages coming from any source; this includes messages generated from data entered on a Web form. Using the ERS, you can take the contents of messages created from a Web form and use it to update applications, send alerts, auto-respond to the person who filled out the form.

Supported Email Systems

ERS supports all major email systems, including those that are "Internet", "Mapi", "Exchange", and "Vim" compliant.

How ERS Works

Here is an overview of how ERS works:

- You identify what email accounts to monitor for incoming messages.

- When a new message arrives, Perspective Workflow loads its data into a table called "Inbox".

- Queries check the content of the message to see if it meets certain criteria.

- Events that use these queries send out alerts, auto-respond to the sender, and (if appropriate), update application databases with the message data.

The key to this process is that Perspective Workflow takes each incoming message and creates a database record out of it. As a result, standard query and event design functions are used to process and respond to that message.

What This Section Covers

This section covers the steps to configure Perspective Workflow to monitor incoming email and load those messages into a table called Inbox.

Once the messages are loaded, refer to the chapters on "Query Designing" and "Event Designing" for details on how to identify and respond to those messages.

Add ODBC Source for ERS Database

Perspective Workflow processes incoming email messages by loading them into a table called "Inbox". Regardless of your Perspective Workflow database (SQL or Access), ERS uses a Microsoft Access data source (which acts as a "linked table" under the SQL version of Perspective Workflow).

To define an ODBC source for ERS. follow these steps:

1. Go into Data Source (ODBC) configuration on the Perspective Workflow server.

2. Click on the System DSN option and then on "Add."

3. Select the Microsoft Access driver and click on "Finish."

4. Enter "ks_inbox" as the data source name.

5. Enter "ERS" as the description.

6. Define the location to "ks_inbox.mdb" in the Perspective Workflow "Data" folder.

7. Save the source.

Identify Email Accounts to Monitor

To identify the email accounts that will be monitored for incoming messages, follow these steps:

1. Log into the Administrator and double-click on the "Software Setup" branch.

2.   Single-click on the "Email Accounts" branch.

3.   If the account you wish to monitor is listed on the right, double-click on it; if not, click on the "New Email Account" button at the top-left.

Email Account Properties

Fill in the following fields as detailed:

- Email Type: Select Exchange, Mapi, Vim, Internet, or Unknown.

- Account Description

- Login Name: The login user name for the account. Use the profile name for Mapi, and use the mailbox name for Exchange.

- Password

- Postoffice: For Exchange, this is the Exchange server name; for Lotus Notes and Vim, fill this in only if the postoffice you are using is different from the default postoffice.

- Active: Whether messages sent to this account should be monitored.

- Incoming Mail POP Server Name: For Internet only; the name of the POP server.

The completed "General" tab will look like the following:
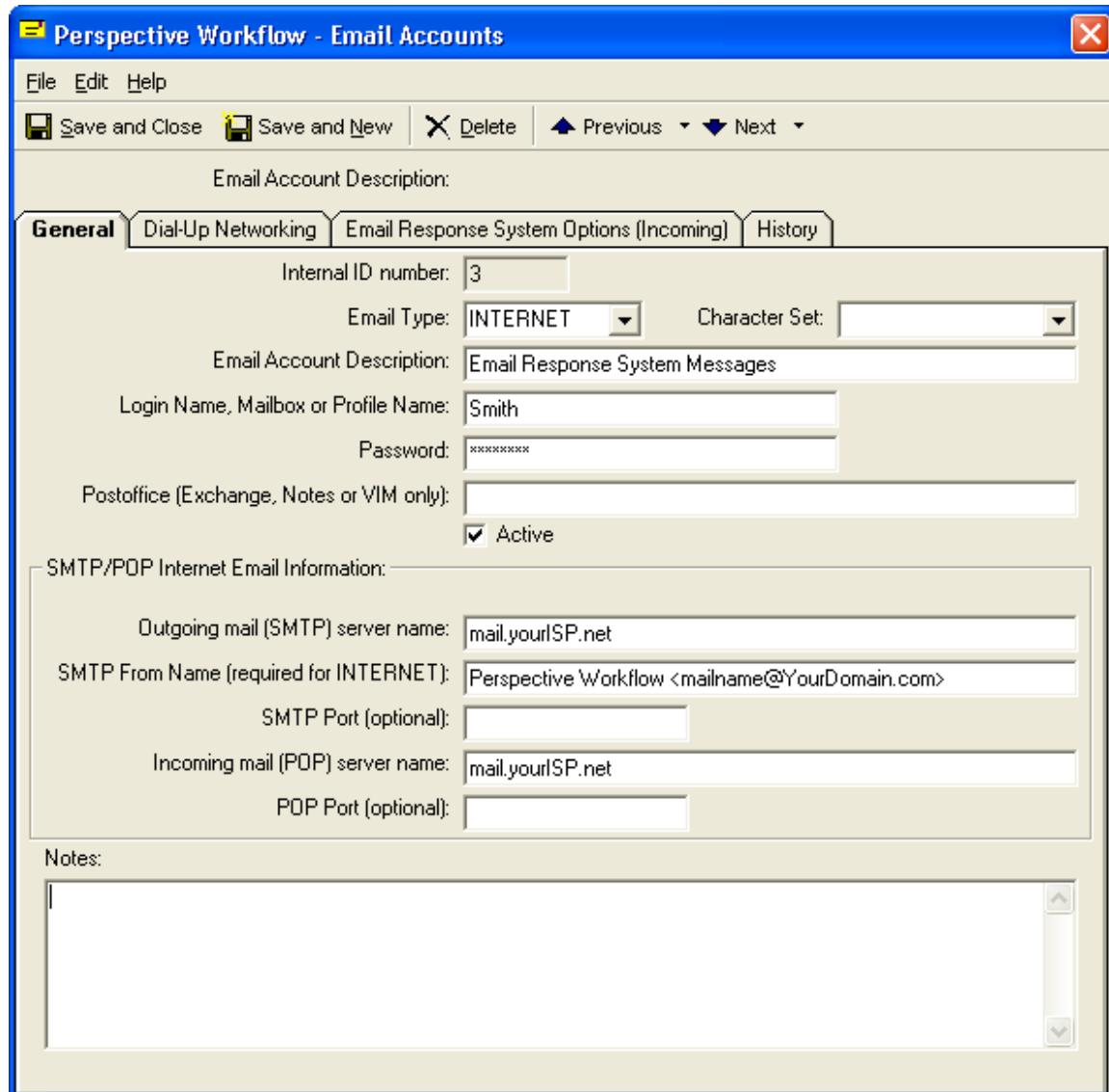
Email Response System Options

Fill in the fields as follows:

- <u>Download incoming messages</u>: Check this box if Perspective Workflow should download messages sent to this account.

- <u>Check for new messages every n minutes</u>: Specify how often (in minutes) Perspective Workflow will check for new messages sent to this account.

- <u>Refuse attachments for this account</u>: (For Internet mail only.) Check this box if you do not want to download email attachments. (ERS cannot scan the contents of attached files, but can scan the <u>names</u> of attachments.)

- <u>Delete messages after downloading</u>: Check this box to delete downloaded messages from the email server after they are stored in the ERS database. (Check this option <u>only</u> if there are no other applications or email clients that need these messages.)

- <u>Remove records from database after n days</u>: Specify the number of days that email records will be kept in the ERS database. PPM 2000 recommends 120 days; specify a value of '0' to keep email records indefinitely.
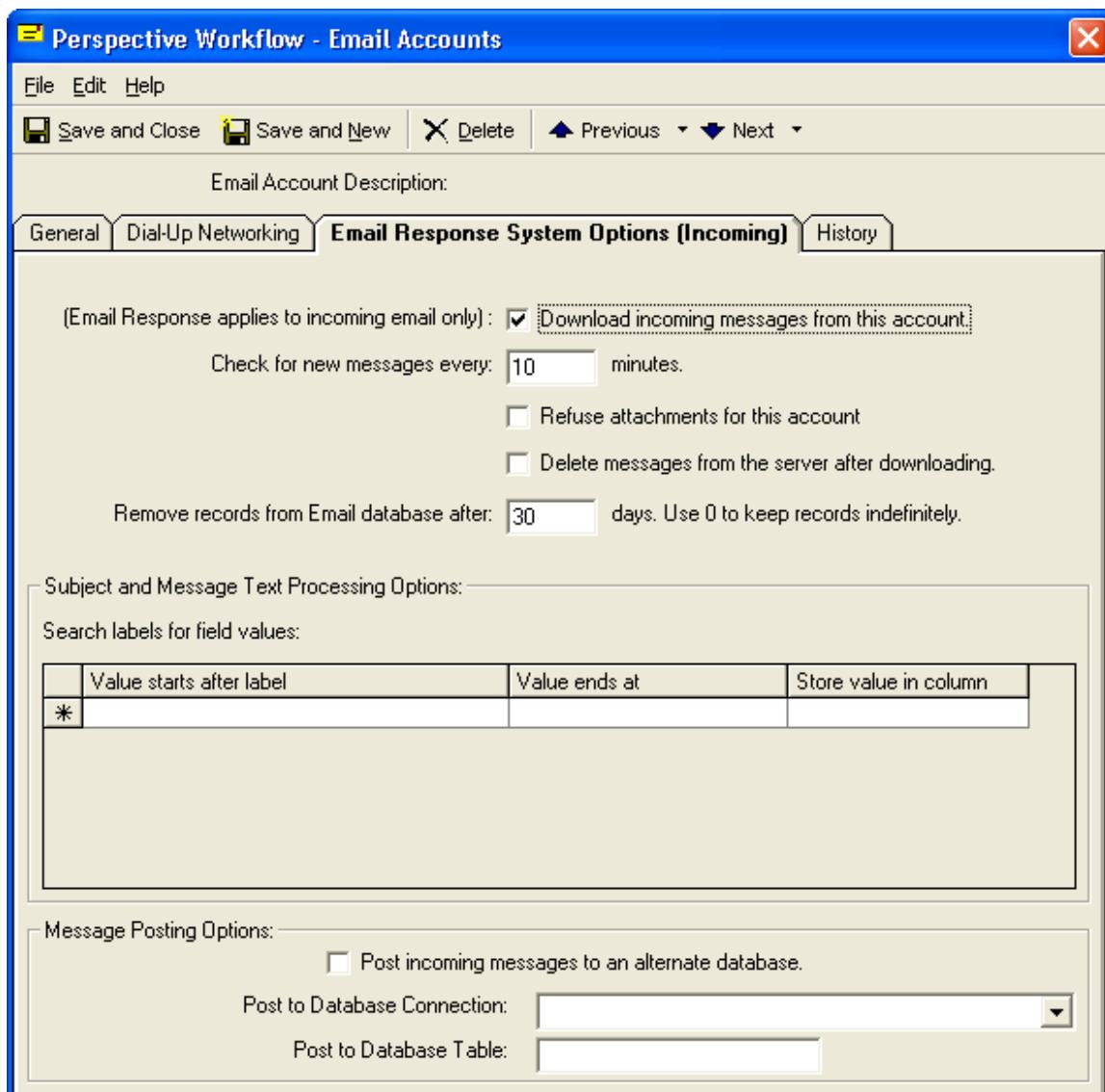
ERS & Attached Files

Although the ERS cannot scan the <u>contents</u> of attached files, it can identify whether a message has attachments, and the names of them. Additionally, attachments are automatically stored in the Perspective Workflow "Attachments" folder, and an ERS event may copy or move the attached files to a location of your choice.

Attachment files are always created with unique names. And note that HTML emails always include one attachment that contains the HTML message text.

Message Text Parsing

Perspective Workflow can parse through the contents of incoming messages and can load individual elements of message data into specific fields in the ERS inbox table.

For example, consider mail message text like the following:

Organization Name: Acme Corporation
Address: 1 Main Street
Contact Name: Robert Smith
Phone 800-555-1212

You can tell Perspective Workflow to take the value after "Organization Name:" and store it in the inbox field called "account". Likewise, the value after "Address:" could be stored in an Inbox field called "address" and so on.

This is referred to as "parsing" the data in an incoming message and mapping to a corresponding field in the inbox table. The inbox table comes pre-configured with a number of fields that can have data parsed into them from an incoming message; you may also modify the inbox table to include additional fields that you'd like to map data to.

Modifying the Inbox Table

You can modify the Inbox table to add columns or modify the names of existing columns. You must stop the Perspective Workflow service before making changes and re-start the Service when done.

If you wish to modify the inbox table and are running Perspective Workflow in a SQL environment, please follow these steps:

1.   Stop the Perspective Workflow service.

2.   Modify the inbox table.

3.   Run the "Reset Database Location" utility from the Perspective Workflow Programs Group.

4.   Re-start the Perspective Workflow service.

Pre-Defined Loadable Inbox Fields

The following fields in the inbox table may be loaded with data from incoming messages.

Inbox Loadable Database Fields (Page 1 of 2)

Inbox Field Name	Default Purpose
Account	The sender's account name.
Account_no	The sender's account number.
Address	The sender's address.
Application	The application the sender is writing about.
Case_no	The case number referenced in the message.
City	The sender's city.
Country	The sender's country.
Email	The sender's preferred reply-to email address.
Fax	The sender's fax number.
First_Name	The sender's first name.
Full_Name	The sender's full name.
Incident_No	The incident number referenced in the message.
Last_Name	The sender's last name.
License_No	The license number referenced in the message.
Mobile	The sender's cell phone number.
Notes	Message notes.
Order_No	The order number referenced in the message.
Pager	The sender's pager number.
Phone_Home	The sender's home phone number.
Phone_Work	The sender's work phone number.

Inbox Loadable Database Fields (Page 2 of 2)

Inbox Field Name	Purpose
Postal	The sender's postal (zip) code.
Problem	The description of the problem/issue.
Product	The product that the sender is writing about.
Question	The question text.
Request	The request details.
Serial_No	The serial number.
Service	The description of the service required.
Service_No	The service number referenced in the message.
Solution	The solution text for a problem or question.
State	The sender's state.
Ticket_No	The ticket number referenced in the message.
Title	The sender's title.
Tracking_No	The tracking number referenced in the message.
Ufld_Flag	Integer-based user-definable field.
Ufld_Memo	Memo-based (long text) user-definable field.
Ufld1 – Ufld5	Five user-definable ERS data fields.
User_Name	The sender's user name.
Version	The version of the product referenced in the message.
Web_Site	The sender's Web site address.

How To Specify Inbox Parsing

The order in which you specify the parsing fields must be the same as the order that the fields will appear in within incoming email messages. To configure mail message parsing, follow these steps:

1. Click in the "Value Starts After Label" field.

2. Key in the text that will precede the value (e.g., "Contact Name:").

3. Click in "Value Ends at" and choose from:

    *   Carriage return.

    *   Line feed.

    *   Blank space.

    *   End of message subject.

    *   End of message body.

    *   End of subject or message.

4. Click in "Store Value in Column" and select (from the drop-down list) the inbox field to load this value into.

5. Repeat for each field you wish to map.
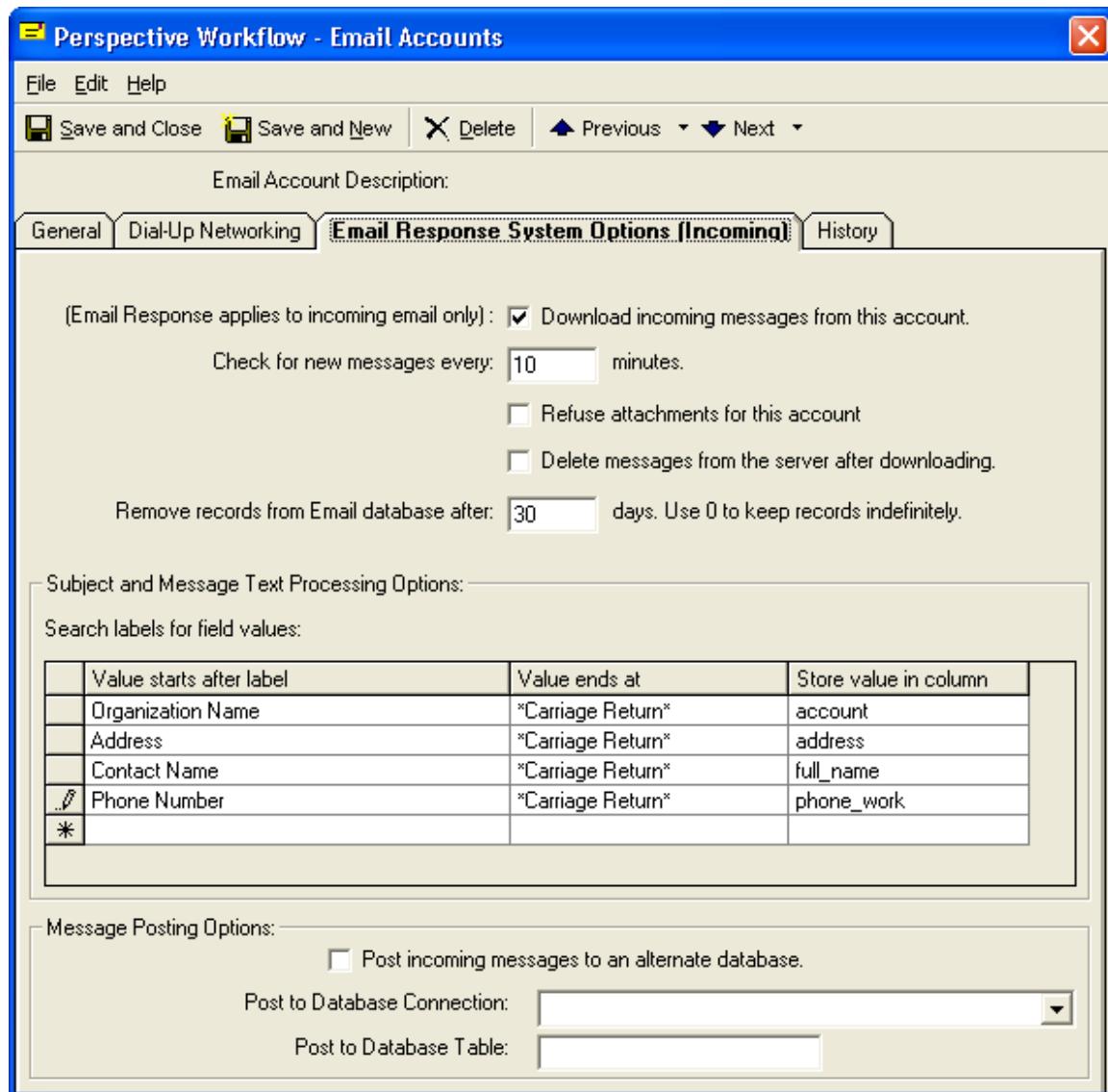
Message Posting Options

You have the option to specify whether you would like to post (store) downloaded mail messages to another database for storage and/or historical reporting. To use this function, follow these steps:

1. Check the option to "Post incoming messages to an alternate database".

2. Choose the ODBC source that connects to this database.

3. Enter the name of the table (within the alternate database) to which the inbox records will be posted.

The alternate database table must be configured to exactly mirror the column names that exist within the inbox table, and the alternate database table must have a unique primary key.

Create ERS Application

ERS queries and events must be stored within their own application in Perspective Workflow. To configure this, follow these steps:

1. Log into the Navigator and expand the All Events branch; if a sub-branch for the Email Response System exists, right-click on it and choose "Properties".

    If an ERS branch does not exist, right-click on All Events and choose "New Application".

2. Click on either "New Connection" or "Edit Connection".

3. Enter "ERS" as the connection description and then select the ODBC source that points at the inbox database.

4. Save and close your work.

Inbox Queries

ERS queries retrieve data from only a single table—the inbox table. This table contains both "loadable" fields (detailed earlier in this chapter), as well as pre-loaded fields that Perspective Workflow populates with details from incoming messages.

The following list describes all of the inbox pre-loaded fields. A query may retrieve and use data from any combination of loadable and pre-loaded data fields.

ERS Pre-Loaded Fields (Page 1 of 2)

Inbox Field Name	Purpose
Attachment_Count	Number of attachments, including alternate HTML text.
Attachment_Files	Comma separated list of attachment file specifications. Attachments are stored in the attachments folder.
Attachment_Names	Comma separated names of the attachments.
Attachment_Start	(0, 1, or 2.) '0' indicates no attachments, '1' indicates one or more attachments, '2' indicates attachments beyond alternate HTML text.
CC_Names	The "cc" names from an incoming message.
Certified	Whether the message was sent certified.
Created_dt	The date/time the mail message was created in the inbox.
Email_Account	The name of the email account the message came in to.
Email_Account_Id	The ID email account this message came in to.
From_Name	The email "from name", such as 'John Smith'.
From_Path	The full path of the sender's name, such as 'John Smith <smith@mycompany.com>'.
From_Root	The email address of the sender, such as 'smith@mycompany.com'.
ID	ERS-assigned unique column.
Inet_Alt_Count	The number of "alternate" attachments. (For Internet type mail systems only.)
Inet_Mail_Program	The name of the email client used to send the email. (For Internet type mail systems only.)
Inet_Message_Length	The length of the message (in bytes). (For Internet type mail systems only.)

ERS Pre-Loaded Fields (Page 2 of 2)

Inbox Field Name	Purpose
Inet_Priority	The priority of the message. (For Internet type mail systems only.)
Inet_Raw_Header	The header of the email message. (For Internet type mail systems only.)
Inet_UIDL	Internal Internet mail identifier. (For Internet type mail systems only.)
Inet_Webform	'0' (not from Web form) or '-1-' (from Web form). (For Internet type mail systems only.)
Inet_Webform_Fields	The names of the Web form's fields. (For Internet type mail systems only.)
Inet_Webform_Values	The values of the Web form's fields. (For Internet type mail systems only.)
Login_Name	The login name of the account for this message.
Message	The mail message text.
Message_Id	The unique message ID. (For Internet type mail systems only.)
Received	The date the message was received.
Received_dt	The date and time the message was received.
Sent_dt	The date and time the message was sent.
Subject	The subject of the message.
To_Names	Whom the email was sent to.

Although a VB script gives you more flexibility in terms of creating database records based on receipt of an incoming email, it does require VB expertise. The use of two queries requires no programming knowledge.

When you use two queries in an inbox event, the first query retrieves the email records, and the second query links those records to your Perspective database.

This requires identifying a field in the inbox record that would allow it to link to a Perspective record. This might be the sender's email address ("from_root"), but could also be any other field in the message that corresponds to a matching field in your Perspective database.

Using a field, such as the sender's address, your two queries would work as follows:

- Query #1 (retrieving inbox records) would include the linking field (i.e., the sender's address, "from_root") as one of the fields in the query.

- Query #2 (retrieving corresponding info in Perspective) would have a filter that compares the email address in the Perspective application (e.g., "dbo.PWFPersons.EmailAddress") to the customized name of the inbox sender address field (e.g., "{from_root}").

This is illustrated in the following:
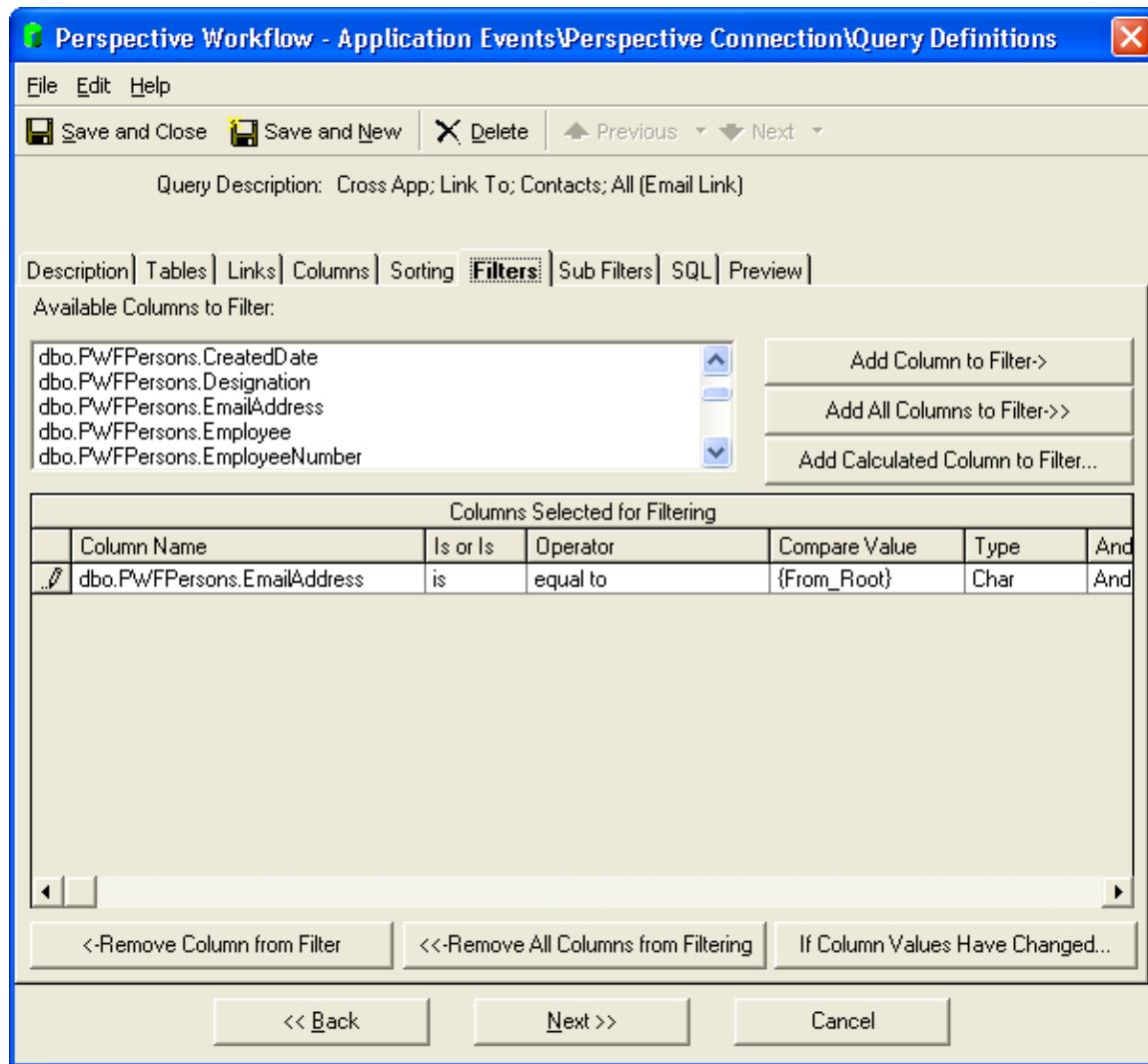
An event that uses two queries in this manner will trigger only if the sender's address is also found in the Perspective database. Once a match is found, all of the fields of data from both queries may be used in alert messages and in workflow actions.

(And, although the above scenario identifies message senders who exist in a Perspective database, you could construct a similar event where your second query looks for no matches to your Perspective database. This would identify a new contact.)

Alerts & Actions

In terms of responding to an inbox event, Perspective Workflow can send messages to:

- The officer or supervisor associated with a record.

- The sender of the incoming mail message.

- Managers, partners, etc.

These messages can include all standard content associated with a database event.

Perspective Workflow can also execute workflow actions as a result of a triggered inbox event. One common use of an inbox action is to have an event take information from an incoming email and pass that into a VB script or other Perspective Workflow API to create or update records within an underlying application database.

Using Email for Report Requests

You can use ERS as a way to allow officers or members of other teams to request and receive forms, documents, or even reports. Consider the scenario where an organization has staff who need to run reports, but have to ask their IT department to do so.

Using the ERS module, the organization could configure a mailbox called "report_requests" and whenever a staff member needs a report, they send a message to that account. The message includes the name of the report to run.

When this message is emailed in, Perspective Workflow receives it, uses a query to determine which report is being requested, and then runs the report and emails it back to the requester—all done automatically, without human intervention.

(And the report request can even include selection parameters.)

Inbox Event Schedule

Since you want Perspective Workflow to respond to incoming mail messages as soon as they are received, all inbox events should use a frequency of "When Email Arrives."

Inbox Events in the Monitor

To monitor the status of inbox events, use the Monitor. Although inbox events turn into standard application events, there is an additional branch called Email Response.

The Email Response branch lets you check to see what mail messages have been received (and logged) into the inbox database.

Once an incoming message has been received and loaded into the inbox database, you may use the standard application event and delivery branches of the Monitor to check to see if the inbox event was triggered, who was notified, what applications were updated, and so on.

Reports

Perspective Workflow embeds version 11 of the Crystal Reports runtime engine; this supports any reports written in Crystal versions 8.5 to 11.5.

Perspective Workflow can automatically generate reports, documents, and forms (collectively referred to as "reports") and deliver them to one or more recipients. Perspective Workflow can generate and deliver reports:

- On a scheduled basis, such as daily at 9 AM or every Friday at 5 PM.

- When an event's conditions are met.

You do not need to install Crystal Reports on the Perspective Workflow server, but do check to see if the Perspective Workflow server already contains a version of Crystal Reports on it. You can have only a single version of Crystal Reports on a server and the most recent installation of Crystal will overwrite any previous installations.

Reports Vs. Forms & Documents

Perspective Workflow can be used to create and deliver forms and documents.

All of these are created using Crystal Reports, as that application includes the formatting capabilities to create a document or form exactly as you need it to appear.

This section makes frequent reference to "reports". Please note that this reference includes the ability to generate forms and documents.

Report Definitions

The first step in enabling reports is to tell Perspective Workflow which Crystal Reports you wish to generate. Reports are organized according to the application they work with, and the reports must already have been created in Crystal in order to define them within Perspective Workflow.

In the design of your report, the option to "Save Data With Report" must <u>not</u> be selected from the "File" menu within Crystal and the reports defined in Perspective Workflow <u>must</u> (in Crystal) be configured to use the same ODBC source as the corresponding application in Perspective Workflow.

To define your reports, log into the Navigator, expand the All Events branch, right-click on the application you wish to define a report for, and choose the option called "New Report Definition". Fill in the fields as follows:

- <u>Report Name</u>: A short description of the report.

- <u>Report Description</u>: The report name is copied to this field; use the description field to contain a more detailed description of the report.

- <u>Report File</u>: This is where you specify the source (*.rpt) file that corresponds to this Crystal report. Use the "Browse" button to help you locate the corresponding file.

  <u>Do not reference mapped drives</u>; specify the location using UNC format. If you refer to a destination on another computer, make sure the user account running the Perspective Workflow service has read rights on the other computer.

- <u>Report Output Filename</u>: The name that will be given to the output of this report. Do <u>not</u> specify a disk or directory; the file will be created in the Perspective Workflow "Reports" directory.

  If blank, the name will be generated by Perspective Workflow. The name must not contain any non-standard characters, such as @,#,$,%,^,&,*,(,),_,+.

  If the report is generated multiple times by the same event, do <u>not</u> hardcode the output name as this will cause each generation to overwrite the last.

Dynamically Naming the Report Output File

You can have Perspective Workflow <u>dynamically</u> name the report output file, based on data from the triggered records.

To do this, you would specify the customized name of the query fields you wish to use in your report output files:

{field_name1}_{field_name2)

Do not specify the file suffix (e.g., .pdf, .html, etc.). Perspective Workflow will append that automatically, based on the selected output format of the report.
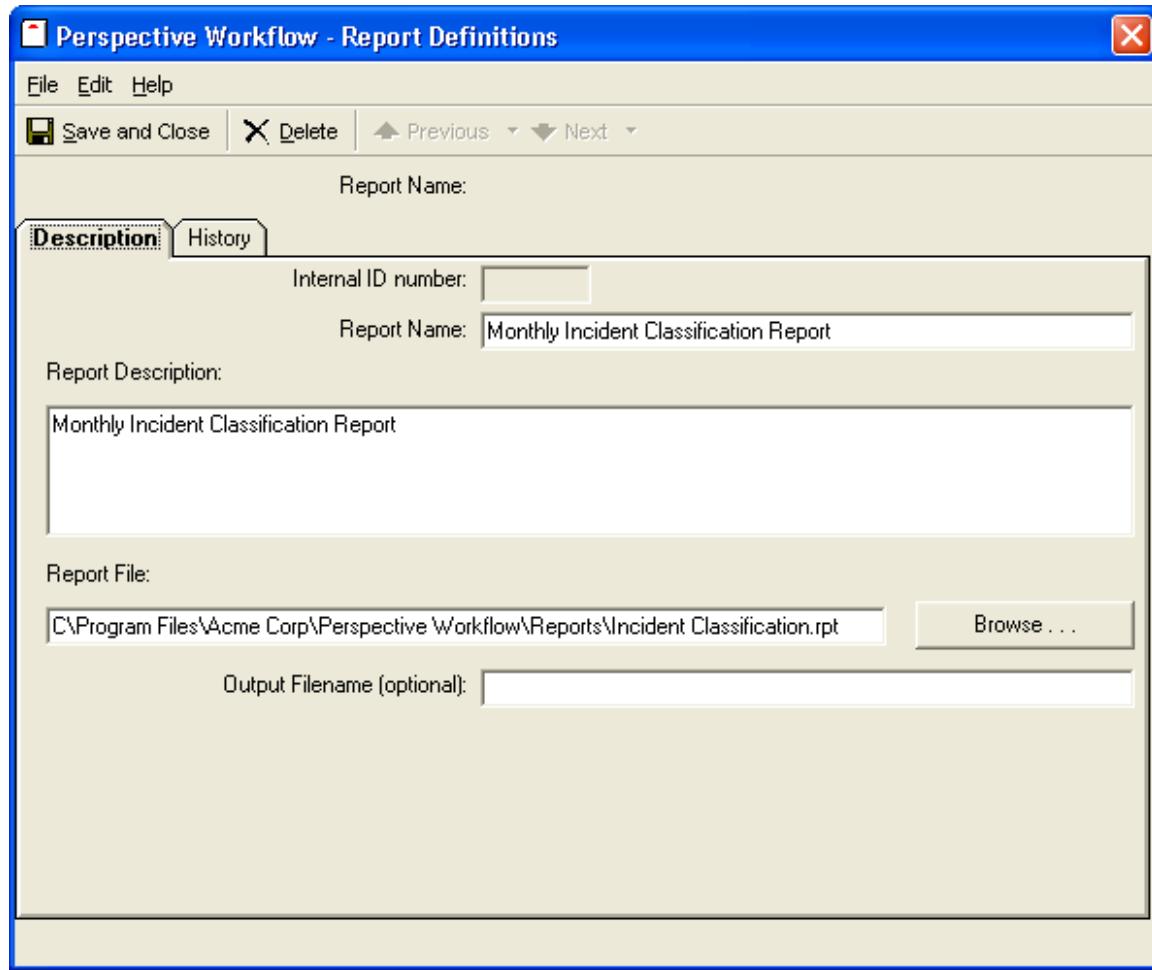
Repeat this process for each report you wish Perspective Workflow to generate.

Scheduled Report Events

A scheduled report event is an event that has no associated queries, and whose purpose is to generate and distribute reports. A single scheduled report event may generate and distribute multiple Crystal Reports.

For example, every Friday at 5:00 PM, an organization might need to distribute the following four reports to all the members of an executive team:

- Weekly incident report.

- Weekly incident losses report.

- Weekly incident recoveries report.

- Incident classification report.

You can create a single scheduled report event (e.g., "End of Week Reports"), and associate all four reports to that one event.

Create a Scheduled Report Event

To create a scheduled report event, follow these steps:

1. Open the Navigator, expand the All Events branch, right-click on the application name and choose "New Scheduled Report".

2. Key in a description of your scheduled report event.

3. Select a priority. This controls the order of submission for multiple scheduled report events that run at the same time. The event with the highest priority ('0' being the highest) will be submitted first.

4. Place a checkmark in the "Active" box.

5. To retain the history of every time this event runs, leave the "Keep only last checked record in Monitor" blank. To retain the history of only the last time this event runs, place a checkmark in this field.
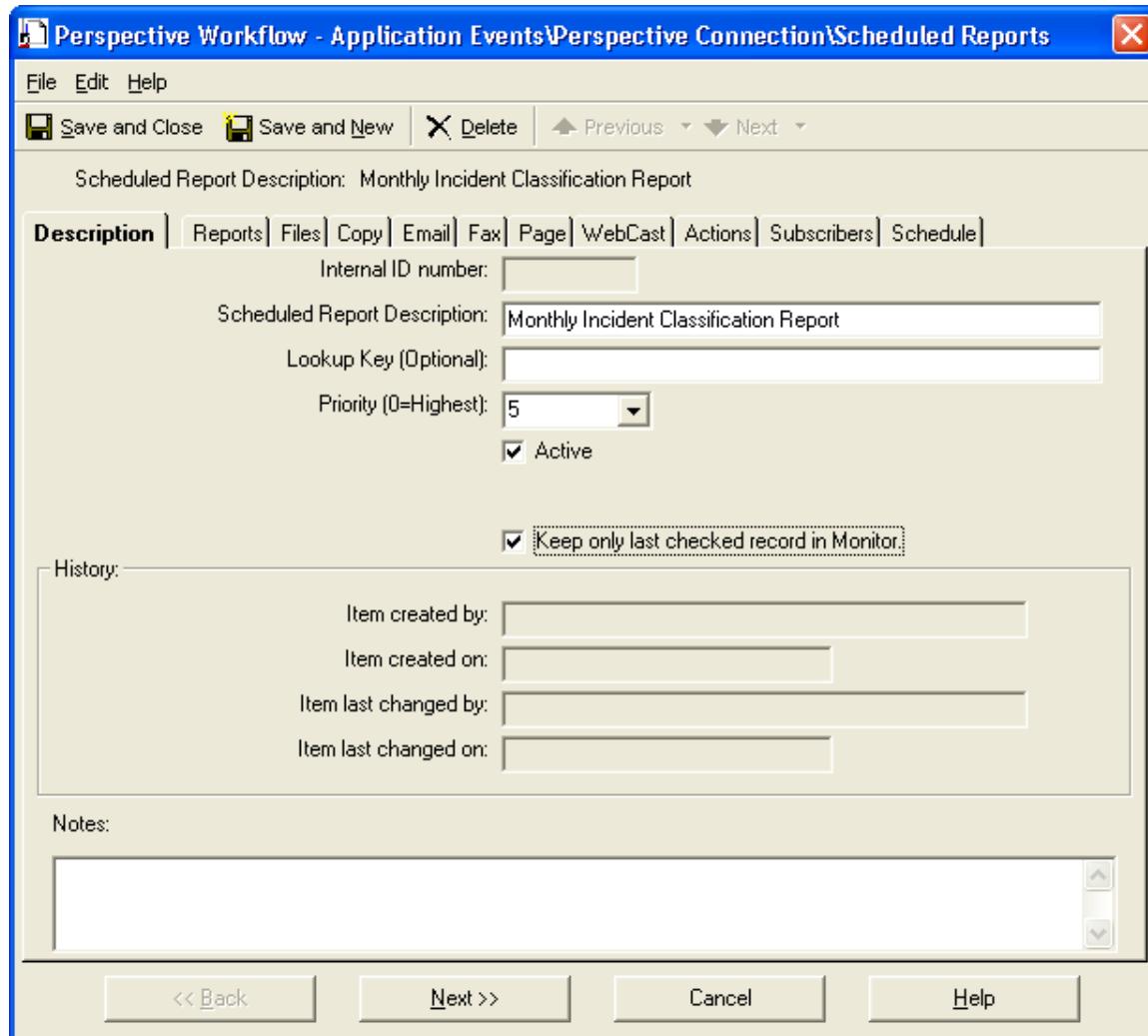
Link the Report(s) to the Event

Follow these steps:

1. Click on the "Reports" tab.

2. Click on the "Add Report" button. You will be shown a list of the reports that are defined for the current application.

3. Select the first report you wish this event to generate.

4. Back on the "Reports" tab, go to the grid titled "Reports Selected for Content" and click in the "Style" column to choose the report output format:

- Ascii

- HTML

- Rich Text

- Microsoft Excel

- Comma Delimited

- Tab Delimited

- PDF

- Microsoft Word

- Crystal

- XML

(The output option of "Crystal" creates a ".rpt" file that may be viewed only by users who have the Crystal client installed on their desktop.)

Optional Where Clause

If you scroll the grid past the "Style" column, the "Optional Where Clause" appears. This may be used if your report does not use report parameters, but does require the use of a "where clause" to restrict which database records the report will retrieve.

Enter your "where clause" starting after the word "where" (do not include the word "where") but if your report already has a where clause and you wish to append additional selection criteria, place a plus sign at the start of your where clause. You may use any of the query's data values and date substitution variables.

If a report event will run multiple reports, continue to click on "Add Report" and specify additional reports. (A single scheduled report event may generate reports from multiple applications; click on "Select Another Application" after clicking on "Add Report".)

<u>Report Parameter Values</u>

Crystal report parameters let a report restrict the records that it retrieves to only those records that meet specific criteria. When a report includes parameters, they appear at the bottom of the "Reports" tab.

For each parameter, you can supply a corresponding value that will be used whenever the report is generated. You may answer each parameter in two ways:

- By manually filling in its value in the "Answer" field.

- By selecting a date substitution variable, such as "today", "tomorrow", or "last Monday". Click in the "Answer" field, click on the List button that appears there, and choose the variable you wish to use.

Delivery Method, Subscribers & Schedule

Once you have selected the reports for a scheduled report event, you need only to select the delivery methods, subscribers, and schedule for the event.

- <u>Delivery methods</u>: Reports can be emailed, faxed (ascii or RTF format only), FTP'd (using the "Copy" tab) or linked to a Webcast (dashboard) page. See "Report Delivery Methods" later in this chapter for details.

- <u>Subscribers</u>: Reports can be delivered to any combination of individual subscribers and subscriber groups.

- <u>Schedule</u>: Reports may use any of the schedules available from the "Schedule" tab of an event.

Event-Triggered Reports

When an event is triggered, it can generate one or more Crystal Reports (typically containing information related to the event), and send those reports either with or without an associated alert message.

When a report is linked to an event that does <u>not</u> use {BEGIN*REPEAT} and {END*REPEAT}, the event will generate one report for each record that meets the event's criteria. For example, a report linked to an event that monitors users that have at least one overdue assignment will generate one report per user that meets this condition.

However, if this same event uses {BEGIN*REPEAT} and {END*REPEAT} to send just one alert message for all matching users, the event will generate just one report as well.

Triggering a Report on True/False Results

For many organizations there is the need to generate a report if a situation proves true or false. For example, you might want to run a report if there were any incident losses over $10,000 last week, or if there were no incident recoveries over $5,000 last week.

To configure either of these conditions, you would design a query that uses the "count" function to count the number of records that meet the query's criteria. In the first scenario, the report would trigger if the count of incident losses (over $10,000) is greater than zero; in the second scenario, the report would trigger if the count of incident recoveries (over $5,000) was equal to zero.

Linking a Report to an Event

Similar to configuring a scheduled report, a report that is linked to an event may include report parameters. Where an event-triggered report differs from a scheduled report, however, is in the following three areas:

- The report will be generated only if the event is triggered.

- The report will be generated once for each triggered record, unless the event is using the {BEGIN*REPEAT} and {END*REPEAT} commands.

- The report's parameters may be filled in with values from the triggered records.

It is the last of these items which is most important. Consider an event that triggers an overdue assignment report for each officer in your organization. Your report would have a parameter that prompts for the officer's ID. Your query would generate a list of officers with overdue assignments (using the "count" function). When you link the report to this event, you will have the ability to pass the ID of the officer with overdue assignments from the query into the report as a parameter.

This way the event will generate one report per officer who has overdue assignments.

Another common example is an event that generates a list of procedures for newly-created incidents with a particular classification. Your report is a list of procedures, and it has a parameter that prompts for the incident number. Your query retrieves a list of all newly-created incidents with classification 'x' (one matching record per incident). When you link the report to the event, you will pass the incident number from the query into the report as a parameter.

Query Design for Event-Dependent Reports

When configuring an event-triggered report, keep in mind that the system will default to generating one report per record that matches the query's criteria. Thus, an event that sends each officer a report of their overdue assignments should not use a query that retrieves all overdue assignments, but rather a query that counts the number of overdue assignments per officer and generates a result set of only those officers where the count of assignments is greater than '1'.

This type of query most typically makes use of an aggregate function, such as the "count" function, as the means to generate a list of records that can correctly "feed" a report's selection criteria.

Also – to ensure that each report gets delivered to the corresponding person, make sure that the event's query also includes the column that contains the delivery address (e.g., email address) of the person for whom the report is being run.

Report Selection

To link an event-dependent report to an event, follow these steps:

1. Open the event you wish to associate the report to.

2. Go to the "Reports" tab.

3. Click on "Add Report" and choose the appropriate report.

4. Click in the "Style" column of the report you just selected and choose a report output format from the following:

    - ASCII

    - HTML

    - Rich Text

    - Microsoft Excel

    - Comma Delimited

    - Tab Delimited

    - PDF

- Microsoft Word

- Crystal

- XML

(The output choice of "Crystal" is usable only by users who have the Crystal Reports "viewer" installed on their client workstation.)

5. Fill in the answers of any report parameters that appear. (For each parameter you can choose to manually fill in the answer, or click in this field and then on the List button to choose either a date substitution variable or a field value from the event's query.)

6. You may continue to select additional reports you wish to associate with this event.

For details on the use of the optional where clause for a report, please refer to the earlier section of this chapter titled "Optional Where Clause".

Report Delivery Methods

Reports may be delivered to recipients via email, fax (ascii or rtf), Webcast, and copy/ftp. You may wish to use one delivery method as a means to alert a recipient to the availability to a report, while delivering the report via another method.

Copy/FTP

Copy/ftp is very useful as a report delivery method, as it allows you to move a report's output to a location that is easily accessible by multiple recipients.

To deliver a report via this method, click on the "Copy" tab and select the option to deliver the reports via this method. Note that the copy/ftp destination is determined within each subscriber's profile in Perspective Workflow. Specify this location in UNC format; do not reference mapped drives.

Email

The first two checkboxes at the bottom of the Email tab allow you to specify whether to attach the selected reports to the outgoing email message.

If you attach reports to an email message, Perspective Workflow will wait until the reports are successfully completed before sending the mail message. If a report fails to complete successfully, the message will not be sent.

If you choose to not attach the reports, you can specify whether the email message should wait until all the associated reports are successfully generated. (Place a checkmark in "Email notifications should wait until reports are generated.")

Embedding the Report Within the Email

If you are sending mail in HTML format, the event may be configured to send the report's contents within the body of the email message itself.

This function is available only if you have Perspective Workflow configured to send out mail via SMTP or any other INTERNET-based mail system.

To configure this, follow these steps:

1.   Choose the Crystal Report whose content you wish to appear within the body of the email message. (You can specify only a single report.)

2.   Choose a report "Style" of "HTML".

3.   Go to the "Email" tab and leave the "Message Text" field blank (empty).

When the event is triggered, Perspective Workflow will generate the corresponding report in HTML and will embed this HTML within the body of the email message that is sent to the event's subscribers.

If a subscriber of such an event is using an email system that does not support HTML, the report will appear as an attachment. Note also that such an event cannot have any other attachments (i.e., no other reports and no attached files).\

Fax

Only ascii and rtf formatted reports may be faxed.

If you wish to send a report via fax, fill in the fax sending account, subject, cover page text, and message text as you require. The first two checkboxes at the bottom of the Fax tab allow you to specify whether or not you wish to attach the selected reports to the outgoing fax message.

If you choose to include reports with the fax message, Perspective Workflow will wait until the reports are successfully completed before sending the fax. If an associated report fails to complete successfully, the fax will not be sent.

If you choose to not include the reports with the fax, you can specify whether the fax should wait until all the associated reports are successfully generated. If you do wish Perspective Workflow to wait, place a checkmark in the field called "Fax notifications should wait until reports are generated."

Pager

When you have a report configured for delivery, you may wish to send a pager alert to notify the recipients that the reports are ready.

If you are sending pager notifications, you can specify whether the pager message should wait until all the associated reports are successfully generated. If you do wish Perspective Workflow to wait, place a checkmark in the field called "Pager notifications should wait until reports are generated."

Checking this option ensures that the recipient of the pager message will be able to access the referenced report at the time the message is received. Note, however, that if this option is checked and the report(s) fail to be completed successfully, the pager message will not be sent at all.

Webcast (Dashboard)

When a report is configured for delivery, Perspective Workflow enables you to specify whether the report will appear as a URL link in a Webcast (dashboard) alert message. (Please see the section on "Dashboard Alerts (Webcasting)" for more details.)

The first two checkboxes at the bottom of the Webcast tab allow you to specify whether you wish to link the selected reports to the Webcast alert message.

If you choose to link reports to a Webcast message, Perspective Workflow will wait until the reports are successfully completed before linking them to the Webcast message. If a report fails to complete successfully, the Webcast message will not be sent.

If you choose to not link the reports to your Webcast message, you can specify whether the message should wait until all the associated reports are successfully generated. If you do wish Perspective Workflow to wait, place a checkmark in the field called "Webcast notifications should wait until reports are generated."

How Reports Appear in the Monitor

Scheduled report events initially show up in the branch called "Report Distribution" and then move to "Report Generation" and then finally move to the branch that represents how the reports are to be delivered to their intended recipients.

Event-triggered reports begin by appearing in "Application Events", from where you can track their status as "checked" and (if appropriate), "triggered." Only if an event is triggered will its associated report(s) be generated.

Once an event with associated reports has been triggered, it will proceed to the "Report Generation" branch. From this branch, you may track the progress of the event's associated reports as they go from a "pending" to a "generated" state.

(If a report fails to generate successfully, it will appear under "Errors" in the "Report Generation" branch.)

Once a report generates successfully, you may click on the corresponding "Delivery" branches within the Monitor and check to see that the message (and report) was successfully delivered.

You may also click on the "Triggered Events" branch and the "Deliverables" button to see whether the notifications included the corresponding reports.

Report Error 541: Error in File

Error 541 typically means that the Perspective Workflow service is trying to create a temporary file for the report and it doesn't have the available room. To correct this problem, log on to the server as the user under which the Perspective Workflow service is running. Follow these steps:

1. Go to your Start menu.

2. Choose "Settings".

3. Go to your Control Panel.

4. Go to the "System" option.

5. Click on the "Advanced" option.

6. Choose "Environment Variables".

7.   The "User Variables" for the Perspective Workflow service user will be displayed at the top. Make a note of the directories that are storing the TEMP and TMP files.

8.   Go to "System Variables".

9.   Make a note of the directories storing the TEMP and TMP files.

10. Go to those directories noted above clear out all unnecessary files.

If you are running FAT32 file System, the maximum number of files or folders allowed in any folder is 65,534 regardless of the file size. The maximum folder size allowed is 4GB.

Not Enough Memory Error

The "Not Enough Memory" error is often not caused by a memory problem, and as such you should check the following:

- If the report is calling external dlls, make sure that the dlls are registered and are installed on the server.

- If the report is passing parameters, make sure they are all answered completely and are of the correct data type.

- If the parameters are prompting for "true" or "false" values, use "1" for true and '0' for false. Do not use TRUE or FALSE.

- If the parameters are using ranges, use the following format with the hyphen as the separator:

  value1-value2

- If a parameter accepts multiple values, use the following format with the comma as the separator:

  value1,value2,value3

- If formulas exist in the report, make sure that the fields they refer to also exist in the corresponding query and that the formulas themselves are valid (e.g., don't try to perform formulas using "string" fields).

Charts and Graphs

Starting in version 2.0 of Workflow, an embedded chart and graph design component has been included with the product.

Reports and charts can be used to add detail to an alert, or may be generated by Workflow as a quick and easy way to create dynamic "dashboards" in a graphic format.

Like Reports, charts can simply be scheduled, generated, and delivered (such as a "Daily Open Tickets" chart) or they can be associated with events (such as an event that checks to see if any support reps have more than 10 tickets assigned to them and–if so–generate and deliver a "Rep Ticket Load" chart.

How to Access the Charting Module

In Workflow, charts are considered a kind of "report"–a graphic one. As such, the option to define a chart is the same as to define a report – the option called "Report Definitions".

Likewise, the option to create a "scheduled chart"–that is, an event that generates and delivers a chart on a periodic schedule – is done via the option called "Scheduled Reports".

Lastly, the option to associate a chart with an event is done from the "Reports" tab of an event. When the option to "Add Report" is selected, the user will be presented with a list of both the defined Crystal reports in Workflow and the list of all defined charts for that Workflow application.

Charts, Events, and Queries

It is very important to understand that a chart uses a query to generate its content. Do not confuse a chart's query with an event's query–charts and events rarely (if ever) use the same query, and it is not recommended that they use the same query.

As such, it is suggested that any queries that you design for use with charts be given a unique naming convention, such as starting the query name with "Chart;… " as in "Chart; Calls Per Rep".

How Charts Are Generated

As mentioned previously, charts have their content driven off of the results of one or more queries. For example, a chart that shows "current month total sales by salesrep" would use a query that totals sales by salesrep and then has a filter to retrieve only those orders that have been placed during the current month.

Likewise, a chart that shows how many support calls are currently assigned to each support rep would count the number of open tickets per rep and would use a filter to retrieve only those tickets that were currently open.

Typically, charts and graphs use aggregate queries (queries that either sum a numeric field or count the number of records meeting certain criteria).

How Charts and Graphs Are Delivered

Charts and graphs can be delivered in the following manners:

- Attached to an email

- Embedded within the body of an email

- Posted to a webcast page

- FTP'd to a destination folder

Chart Design: The Role of "Parameters"

Before you begin designing a chart, you should decide what information you want in the chart. Typically a chart is going to show you the "count" of something–revenues per salesrep, open calls per support rep, and so on.

As mentioned previously, a chart is driven off of a query. Like any Workflow query, a chart's query can use filters to precisely identify the data that is going to appear in a chart, such as selecting specific status codes, product names, or even a date range.

Most importantly, a chart can be made to use "parameters" in the same way a Crystal Report uses parameters.

For example, consider a Crystal "Sales Report". The report has a "parameter" that prompts for the salesrep ID to report on. If you were to manually run that report, you'd specify that ID in order for the report to run.

A Workflow event can run that report. But if you had 30 salesreps, you wouldn't want to set up 30 Workflow events (one for each rep). So Workflow allows you to configure an event to use a query to retrieve those 30 salesrep IDs; those IDs are then passed one-at-a-time into the associated Crystal report and thus the one Workflow event generates 30 reports.

Workflow charts work the same way. When you design a chart's query, you can create "parameters" that work exactly like Crystal report parameters. And, when you configure an event that generates a chart, you can have the event's query pass its resulting data (one record at-a- time) into the chart – thus enabling you to have a single event that generates multiple charts.

Chart Design: Scheduled & Triggered

Like Crystal reports, charts can be scheduled (such as a "daily sales chart"), or charts can be triggered (such as a "tickets per rep" chart if any rep has more than 10 tickets assigned to them).

A scheduled chart event is configured just like a scheduled report event; the event itself has no query associated with it.

A triggered chart event is an event that uses a query to determine if certain conditions are met; if so, the associated chart is generated. Please note that just like when a Crystal report is associated to an event that uses a query, if a chart is associated with an event that uses a query the chart will be generated once for each record that meets the event query's criteria.

(You may override this default setting by using "{BEGIN*REPEAT}" and "{END*REPEAT}" in the event's alert message. If only one alert message is sent out, only one chart will be associated with that alert message.)

A Chart's Query

Let's consider the following desired chart:

- This month's sales per salesrep

This chart will total the current month's sales per salesrep; this chart (as with most) will make use of an <u>aggregate</u> query.

The query for this chart will retrieve data from the "sales history" table (to get the sales numbers) and also the "salesperson" table (to get the salesperson's name). The chart will have only two columns (again, this is typical for most charts), the "sales amount" column and the "salesrep name" column. To "total" the amount for each salesrep, the "amount" field will have its column type changed from "Normal" to "Summarize".

The query will have a filter to retrieve only those sales that were placed during the current month. This filter could be parameter-driven (question marks in the "Compare Value" field) and other filters could be added.

Note that based on the chart "type" (bar, pie, cone, etc.) that you chose, you may want the data to appear in the chart in a specific order, such as showing the greatest amount at either the top or bottom of the chart. To accomplish this you will need to specify the "Sorting" order for the chart's query.

And that's all this query needs to do.

Chart Design: Create the Chart

Select the option to create a new Report Definition and in response to the prompt that reads "Would you like to define a chart style report?", click on the "Yes" button. The following window will appear:
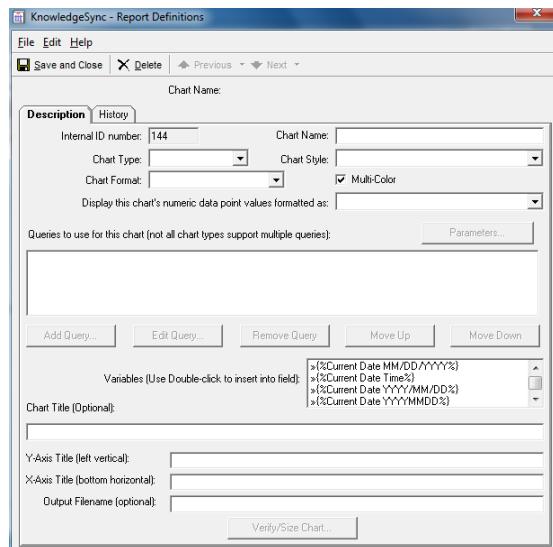
Make your selections based on the options detailed in the following section.

Chart Design: Chart Design Options

The chart design options that you'll need to specify are:

Chart Name: Give the chart a name that describes its contents, such as "Current Month Sales Per Rep".

Chart Type: Select from the following:

- **Area**. This is a line chart in which the space below the line is filled-in with a solid color.

- **Bar**. Each data element from the horizontal ('x') axis is represented by a vertical bar.

- **Cone**. This chart displays as a vertical cone.

- **Donut**. This chart type is very similar to a pie-chart, except that there's a hole in the middle.

- **Funnel**. This chart is shaped like a funnel, with the widest part at the top.

- **Line**. This chart is a line that moves from one data element to the next for the 'x' axis elements.

- **Pie**. This chart type displays as a circle with each 'x' axis element shown as a segment of the pie.

- **Pyramid**. This chart is shaped like a pyramid, with the narrowest part at the top.

There are also three types of charts that are designed for situations where you wish to compare the resulting values from multiple queries. One example of this would be a chart that compares this month's sales per salesperson to last month's sales per salesperson.

There are three types of charts that provide this comparative capability, and they are called "multi-line", "multi-area", and "multi-bar".

Chart Style: The "style" options for a chart will vary based on the "type" of chart selected. For example, a "bar" chart can be configured so that its bars appear "flat" or in "3D", or so that its bars are shaped like crosses, cylinders, or stars.

You can see what the various chart styles look like (after you have chosen the query for the chart) by using the "Verify/Size Chart" button at the bottom of the window.

Chart Format: The "format" of a chart refers to where the descriptions of the chart's various 'x' axis data elements will appear. For example, in a bar or line chart, the descriptions of the 'x' axis data elements will always appear just below the 'x' axis, so there are no formatting options for these chart types.

However – cone, pie, donut, and funnel charts do not use an 'x' axis line, so the data elements can typically appear as follows:

- **Circular Labels**. Data element names appear outside the chart.

- **Circular Labels with Lines**: Data element names appear outside the chart but with lines leading to the corresponding chart section.

- **Inside Labels:** Data element names appear inside the corresponding chart section.

- **Side Labels:** Data element names appear outside the chart lined up on the left and right sides of the chart.

- **Legend Left**: Data element names appear in a "legend box" that is displayed to the left of the chart.

- **Legend Right**: Data element names appear in a "legend box" that is displayed to the right of the chart.

Multi-Color: This option (checked on or off) lets you specify whether the data sections in the chart should each appear in different colors or should all appear in the same color. If you do not select "Multi-Color", you have the option to specify the color to be used for all the chart data elements.

Numeric Data Formatted As: This gives you the option to have the chart display its totals either in local currency format (using the currency settings on the Workflow server), or in numeric (non-currency) format.

Query to be Used: Click on the "Add Query" button and select the query that will drive the contents of the chart. You may select a query from a Workflow application other than the one you are currently working in, and you may use the "New Query" button to create a new query, if no existing query meets this chart's needs.

Please also note that only the three "Multi" chart types allow you to select multiple queries, as these chart types are designed to compare the results of one query with the results from one or more other queries.

Query Parameters: If the chart's query includes "parameters" (filters or sub-filters where the "compare value" is a question mark), you will be prompted to select values for these parameters when the query is selected. Once a query with parameters has been associated with a chart, you can view and change the selected parameters by clicking on the "Parameters" button.

Note that a chart query's parameters can also be answered with values from the event's query (just as Crystal report parameters can be answered with values from the event's query). This capability is typically used to design a single chart event that dynamically generates multiple charts – one chart for each value passed into it from the event's query. For more details on this use of parameters, please refer to the section of this chapter titled "A Parameter-Driven Chart Event".

Chart Title: This is the title that will appear across the top of the chart. By default, the description of the chart's query will appear in this field – followed by a date variable that displays the current date and time. You may modify this title as well as use any of the variables listed in the scrolling window directly above this field.

Y-Axis Title: This is the title that will appear along the left (vertical) side of the chart. Typically this would have a title such as "Total Sales This Month". You may leave this field blank.

X-Axis Title: This is the title that will appear across the bottom of the chart. Typically this would have a title such as "Salesperson Name". You may leave this field blank.

Output Filename: This is the name that the chart file (once generated) will be saved to. Note that all generated charts will (by default) be saved to the Workflow "attachments" folder; once in that folder, Workflow can move (or "copy") the chart file to any destination location.

When choosing an output filename, you may hard-code the name or you may use any of the variable values (date variables & query variables) that appear in the scrolling window. Do not specify an output filename extension, such as "jpeg" or "bmp", as Workflow will automatically append that extension based upon the selected output format of the chart.

Click on the "Verify/Size Chart" button and a window like the following will appear (using your selected chart type & style):
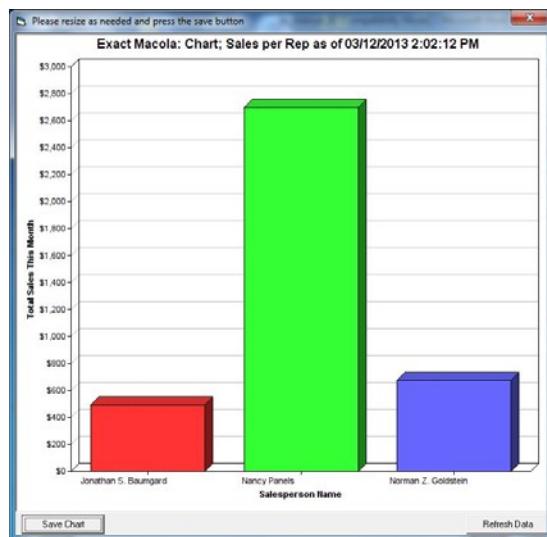
Note that you may wish to re-size this window to give all chart labels enough available space to be clearly displayed. Once you are satisfied with the chart, click on the "Save Chart" button to return to the previous window.

Click on the "Save and Close" button at the top-left of your chart design window to save your work.

"Multi" Charts

One popular use of charts is to compare the performance of one set of numbers against another set of numbers – and represent that difference graphically. For example:

- Compare salesreps' current month-to-date sales with their sales from last month through the same date.

- Compare the number of high-priority support calls logged this year versus last year.

- Compare the sales of different product lines over a specified time period.

As you can see, the most common use of multi-charts is to compare numbers for different members of the same group (salesreps, support calls, products) over a specified time period.

Multi-charts are enabled through your ability to associate multiple queries to the same chart. Most commonly this entails the use of the same query multiple times – and such a query typically has parameter-driven filters to allow for the comparison.

For example, you could compare sales totals per item between two (or more) salesreps. To do this, you would construct a query that has a filter on the "salesrep" field. That way, when you initially select this query for your chart, you will be prompted to select salesrep #1.Then, when you select this same query a second time for this chart, you would select salesrep #2.

So – the steps required to create a multi-chart are as follows:

1. Create a query that has a parameter-driven filter on the data element to be compared – such as the "salesrep" if you wished to compare results across two or more salespeople.

2. Create a new chart and select one of the "multi" chart options.

3. Select the query you created in step #1. You will be prompted to select the first record whose results you wish to compare (in the above example, this would be the first salesrep whose performance you wish to compare to other salesreps).

4. After you select this record, you will be prompted to review, modify, and confirm how you want that first record to be identified in the chart's legend. (For example, if you chose a salesperson whose name is "Mary Shelley", the legend would default to identifying her as "Mary Shelley" but you could modify that to show only her last name, only her first name, et cetera.

5. Notice that the "Add Query" button is NOT disabled after selecting your first query; this is because with a "multi" query you need to select the same query again to choose the a different record whose performance you wish to compare to the first record you chose in step #3.

For example, if you wanted to compare Mary Shelley's performance to that of Jim Kently, you would select Jim's record and also confirm or modify the display of his name in the chart's legend.

6. Verify & (if necessary) re-size the chart. You will now see your chart comparing the results for the two records you chose previously. You may continue to choose the same query (with different parameter selections) if you wish to compare more than just two records.

You would then select the same query a second time for this chart – but this time you would select a date range of "last month". The corresponding multi-chart would look like the following:

Note that you may wish to re-size this window to give all chart labels enough available space to be clearly displayed. Once you are satisfied with the chart, click on the "Save Chart" button to return to the previous window, which appears as follows:
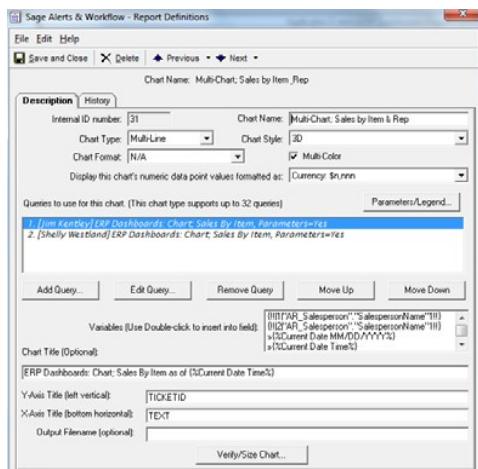
A "Scheduled" Chart Event

Once you have created a chart, you need to decide whether the chart will simply be delivered on a recurring, periodic basis ("scheduled"), or whether the chart will be generated and delivered only when certain business conditions warrant it ("triggered").

If the chart is to be "scheduled", you can use the option to create a "scheduled report". Creating a scheduled chart event is identical to creating a scheduled report event; follow these steps:

- Select the option to create a scheduled report.

- Fill in the "Description" tab of the event.

- Click on the "Reports" tab and click on the "Add Report" button to choose from a list of defined charts as well as reports. Select the chart you wish the event to generate. (You can select multiple charts, or even a combination of charts and reports.)

- Select the "Output Style" of the chart being generated. The default style is "png", which is optimized for delivery via email. You may also choose from output styles including "jpeg", "gif", "bmp", "wbmp", "svg", and "svgz".

- If the chart has any "parameters" (selection criteria) that need to have answers chosen for them, they will appear at the bottom of the "Reports" window. Note that you can select date substitution variables (such as "current date") as answers to date-related parameters.

Charts may be delivered to recipients as email attachments, embedded within an email (select output style "png"), via FTP, and via web dashboard (webcasts) – in which the charts show up as URL links. Please note that all references to "reports" within an event's tabs apply equally to an event's charts.

Once you have selected how the chart is to be delivered, you may proceed with selecting the event's subscribers (alert recipients), and then move on lastly to the "schedule" tab in which you are able to specify either the frequency of generation (for a scheduled chart) or the frequency of checking (for a triggered chart).

When a chart is generated, the chart's file is automatically generated in the Workflow "attachments" folder. Once there you may use a subsequent event (optionally in a job stream) to move the chart file to a destination folder of your choice.

A "Triggered" Chart Event

The only difference between a scheduled chart event and a triggered chart event is that a triggered chart event makes use of a query to determine if certain business conditions exist – and if so, generate the chart.

A triggered chart event can be based on any condition (just like any other Workflow event). You might want to generate a sales chart only if certain salesreps have less than 'x' dollars within their sales pipeline; you might want to generate a customer service chart only of any support reps have more than 10 tickets currently assigned to them.

There is only one special consideration that you need to be aware of. Like associating a Crystal Report to an event, a chart that is associated with an event will generate once for each record that meets the event's query's criteria. Here is an example:

- You want to generate a sales chart if any salesrep has less than $5,000 in their pipeline. You would **not** create an event query that listed any reps whose pipeline is less than $5,000 – because if you had 4 reps who were beneath that number, you'd generate 4 identical charts. Instead, you'd create a query that counted the number of reps whose pipeline is less than $5,000 and you'd have a sub-filter that checks for a count of "greater than zero".

That way, regardless of whether 1, 11, or 21 reps have pipelines below that number, the chart will generate only once.

If a chart is to be "triggered", it is part of a standard Workflow event. Follow these steps:

- Select the option to create a new event.

- Fill in the "Description" tab of the event.

- Select a query for the event. If the query has any parameters (selection criteria), they will appear at the bottom of the Queries tab.

- Click on the "Reports" tab and click on the "Add Report" button to choose from a list of defined charts as well as reports. Select the chart you wish the event to generate. (You can select multiple charts, or even a combination of charts and reports.)

- Select the "Output Style" of the chart being generated. The default style is "png", which is optimized for delivery via email. You may also choose from output styles including "jpeg", "gif", "bmp", "wbmp", "svg", and "svgz".

- If the chart has any "parameters" (selection criteria) that need to have answers chosen for them, they will appear at the bottom of the "Reports" window. Note that you can select date substitution variables as well as results from the event's query as answers to date-related parameters (see following section).

Parameter-Driven Chart Events

There are circumstances where you want a chart event to generate one chart for each matching record that the event's query retrieves. For example:
- You have an event that checks to see if any support reps have more than 10 calls assigned to them. For any reps who do meet this condition, you want to generate a

chart for each of them – each chart showing the number of calls per "urgency code" assigned to each rep.

The above scenario would use a query that counts the number of calls assigned to each rep and has a sub-filter that retrieves all reps with more than 10 calls. Thus if there were seven reps with more than 10 calls assigned to each of them, your query result set would be seven records long – and you'd want Workflow to generate a separate chart for each of them.

This is where parameter-driven charts are essential.

Passing Query Values Into a Chart's Parameters

A parameter-driven chart event is an event that uses the results from its query to "feed" values into the associated chart and thus dynamically create a unique chart for each record that meets the event query's criteria..

For example, you may have a query that identifies salesreps whose current month's sales pipeline is below $5,000. If any rep's pipeline meets that criteria, you want to generate a separate chart for each salesrep showing their current month's pipeline totals by product line.

The event's query (containing the IDs of the reps who meet the above criteria) need to pass its results into the event's chart, so that the chart can be generated once for each salesrep.

Here's what you'd need to do:

1. Create the event's query. It would look for the above criteria and return a list of matching reps and their IDs. If you wanted to send each chart to the corresponding rep, you'd make sure that this query also includes the rep's "delivery address", such as their email address.
2. Create the chart's query. This query would contain two columns; the forecast sales amount of each opportunity (summarized), and the product line. This query would also have a filter on the "salesrep ID" field. If you previewed the query you would select a specific rep and then see their current month's forecast sales totaled by product line.

3. Create the chart itself. When you select the query (from step #2) for this chart, a "Parameter Window" will appear. Enter a single question mark in this parameter so it looks like the following:
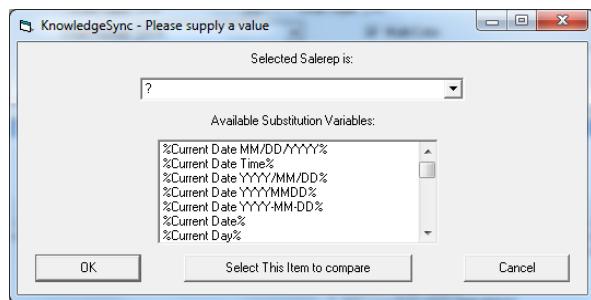
The question mark in this field is what will enable the event to "pass" parameter values from the event's query into the event's chart.

4) Create the event. Select the query created in step #1. On the "Reports" tab of the event, select the chart created in step #3. When you select the chart, the chart parameter field that you created in step #3 will appear as follows:
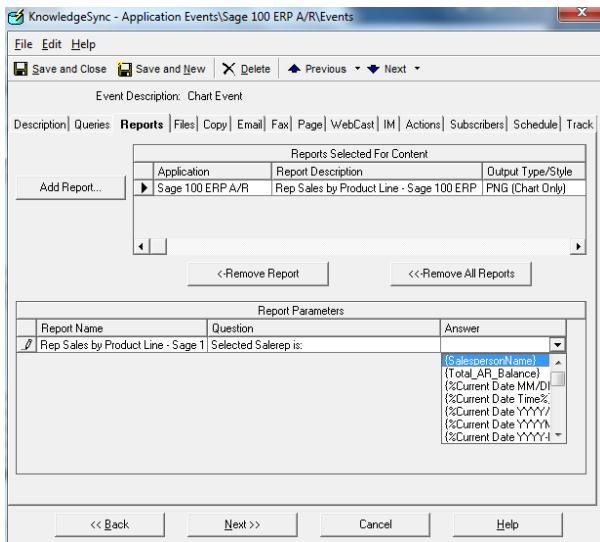
Click in the "Answer" field and a list of fields from the event's query will appear; select the field that contains the value you want passed into the chart.

Finish selecting the event's delivery methods, subscribers, and schedule, and you've got a triggered chart event, complete with parameters passed from the query into the chart, ready to go.

Date-Sensitive Charts

One of the most powerful uses of charts is to display "performance over time" graphs. For example:

- Sales this month versus last

- Number of support calls logged daily this week

- Scheduled phone calls per hour

For charts such as these, the corresponding queries are typically going to start out with a column that either "sums" a value (such as the amount of a sale) or a column that "counts" the number of records (such as the number of support calls) over a specific time range and – most importantly – "broken" by a specific date or time segment, such as yearly, monthly, daily, or hourly.

There is a very handy SQL command that lets you retrieve only the "year" or "month", or "day" (number; from 1 - 31) from a date field in a database. These functions look like this:

day(sysdba.ACCOUNT.CREATEDATE)
month(sysdba.ACCOUNT.CREATEDATE

)
year(sysdba.ACCOUNT.CREATEDATE)

In addition to the above commands, the below SQL command enables you to retrieve the "day number of week"; from 1 (Sunday) – 7 (Saturday):

datepart(weekday,sysdba.ACCOUNT.CREATEDATE)

Whereas the following SQL command will show you the "name" of the day of the week:

datename(weekday,sysdba.ACCOUNT.CREATEDATE)

Note that you can combine (concatenate) the preceding two commands together so that you can have both the day number and the day name in a single field in your query:

convert(char(1),datepart(weekday,sysdba.TICKET.CREATEDATE)) + '-'
+datename(weekday,sysdba.TICKET.CREATEDATE)

(The "convert" function is also used in the above command because the "combined" field has to be an alphanumeric field in order to contain both the day number and day name.)

Here is the SQL command for retrieving the "hour" from a date/time field:

datepart(hour,sysdba.ACCOUNT.CREATEDATE)

The above command will show the hour in 24-hour (military) time.

Note that all of the preceding commands are for use when monitoring a Microsoft SQL Server database; if monitoring a database other than SQL Server, please refer to your database documentation on the use of date-related "scalar functions".

Dashboard Alerts (Webcasting)

Dashboard alerts are dynamically-created (and updated) Web (HTML) pages that contain triggered event details.

How Dashboard Alerts Are Used

Dashboard alerts have three distinct uses:

- Business Area Dashboards: This is a display of information that pertains to a specific business area, such as "overdue assignments" or "incidents open for more than x days".

- User-Specific Dashboards: This is a display of information pertaining to a specific user, such as "my assignments due today or tomorrow" or "my active investigations".

- User Alert Listings: This is a display of all alerts—for all business conditions—that apply to a specific user.

What a Dashboard Consists Of

A dashboard consists of the following components:

- A template which controls the overall design of a dashboard window.

- An event which controls the data within a dashboard.

- Subscribers which specify where dashboard output is to be stored.

Dashboard Setup

The following steps will walk you through the creation of a single dashboard.

Enable Dashboard Creation

Since dashboard alerts are a more advanced alert delivery method, the default configuration has dashboards disabled. To enable dashboards, follow these steps:

1. Open the Administrator and click on the "Server Status" branch.

2. Double-click on the "Webcaster Server" (Webcaster = dashboards).

3. Place a checkmark in "Allow Server to Process" and click on "Save and Close".

4. Restart the Perspective Workflow Windows service.

Create Template

All dashboards have a general layout and design that is controlled by an HTML template which looks like the following:

<html>
<head>

```
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
</head>
<body>
<table border="0" id="table1">

        <tr>

                <td colspan="4">{EVENT_MESSAGE}</td>

        </tr>

</table>
</body>
</html>
```

If you wish to edit this template (to include your company name, logo, etc), you must use an HTML editor to do so. (Do not edit this in Microsoft Word, as it will lose its formatting.) You may edit a template using "Notepad" if you have no HTML editor available.

The only "variable" field in this template is called {EVENT_MESSAGE}. This field contains the contents of the "Webcast" tab of the event which generates a Dashboard.

Storing the Template

PPM 2000 suggests storing templates in the Perspective Workflow "Webcaster" folder: C:\Program Files\PPM 2000 Inc\Perspective Workflow\Webcaster.

Creating Multiple Templates

You may create multiple templates for the following reasons:

- To have different dashboard layouts for different recipients. E.g., You might have one template that is used for your internal dashboards, but a different template for dashboards that are going to be seen by personnel from other departments.

- To be able to create dashboards that reside in different locations (because each template has its own "root publishing location"). This might be needed where the security and sensitivity of dashboard data is critical; e.g., internal dashboards might be stored inside the firewall, whereas dashboards for external departments might be stored outside it.

To create multiple templates, make a copy of the original template, make any necessary changes to the new one, and then save the new template with its own unique name.

Create Publishing Location

You must specify where (system folders) dashboard output is to be stored. This is referred to as a dashboard's "publishing location".

Dashboard output may be stored in one location or multiple locations, such as storing each person's dashboards in a distinct folder. For example, you might wish to store dashboards for Don Farber in a folder called "Farber".

And if you were creating dashboards for use by a number of people, you might create folders called "Investigators" and "General".

PPM 2000 suggests that published dashboards be stored in sub-folders beneath the Perspective Workflow "Webcaster" folder, but additional locations may be specified if needed.

Add Publishing Location Folder(s)

The steps below show the creation of a publishing location beneath the Perspective Workflow "Webcaster" folder. Follow these steps:

1.   Open Windows Explorer and navigate to the folder where you installed Perspective Workflow.

2.   Navigate to the "Webcaster" folder.

3.   Create a new folder (beneath the Webcaster folder) and give it a name according to the person or group who will be receiving dashboard alerts.

Define Default Template & Publishing Location

Although you may define multiple templates and publishing locations, the dashboard alerts module requires that you create a "default" template and publishing location record. This becomes the template that Perspective Workflow uses for every event if no other specific template is defined.

Follow these steps to define the default template and publishing location:

1.   Open the Administrator and expand the "Software Setup" branch.

2.   Click on the option called "Webcast Locations" and then click on the button called "New Webcasting Location".

3.   Give this template a name of "Default" (all uppercase).

4.   Specify the name and location of the default template that will be used. Do not reference
mapped drives; use UNC specifications instead.

5.   The "Publishing Location" is the name of the folder <u>beneath which</u> you have defined
individual publishing locations (sub-folders).

For example, if you created publishing locations (folders) beneath the "Webcaster" folder
called "General", "Murphy", and "Farber", your selection for the publishing location would be:

D:\Program Files\Perspective Workflow\Webcaster\

(Do not use mapped drives and make sure you place a backwards slash at the end of the
publishing location. This tells Perspective Workflow to put the dashboard output into the
appropriate sub-folders beneath this location.)
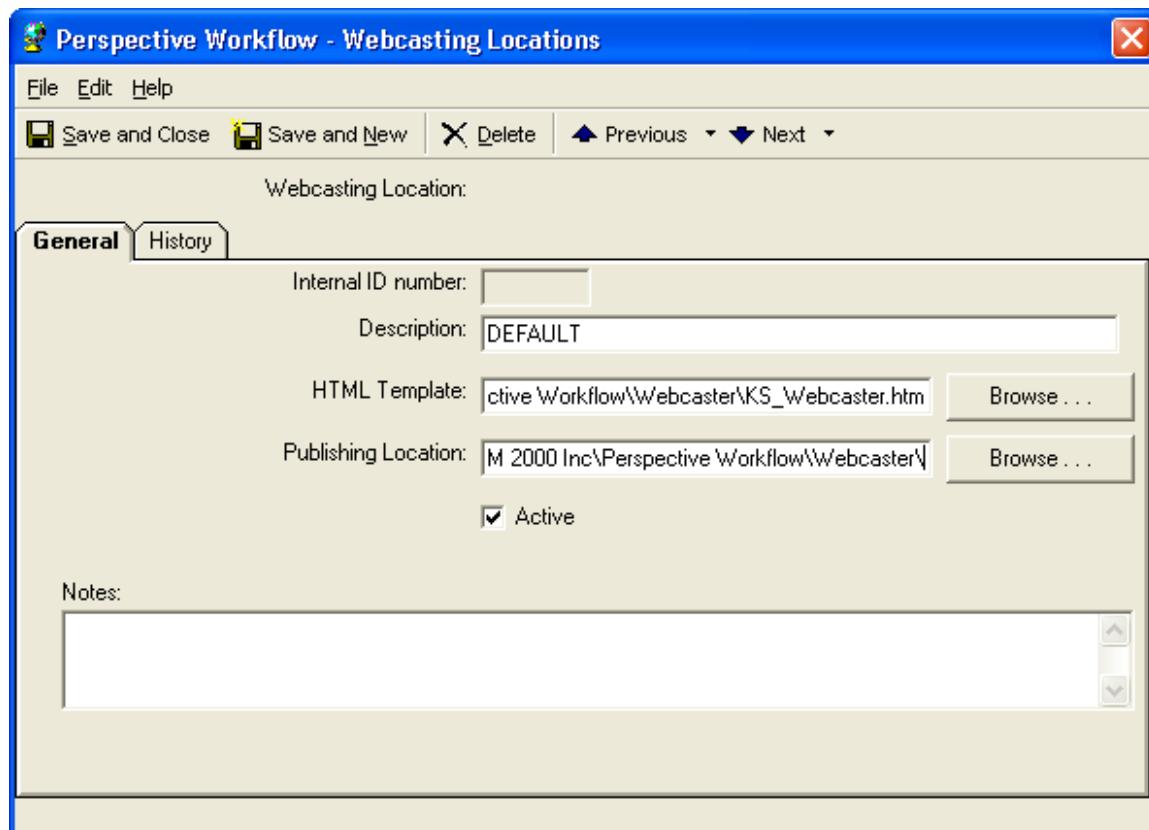
Note the following about publishing locations:

•   The computer running Perspective Workflow must have write capability to the publishing
location.

- You may specify an FTP address as the publishing location using the format "ftp://username:password@ftp.location.net/directory_name".

- You may use a WML file as a template to support WAP access for handheld devices.

Dashboard Subscribers

Dashboard subscribers are most often controlled via the event's query; no other subscriber set-up is required.

Only when a dashboard is used as a "User Alert Listing" are traditional subscribers used. Please see the section of this chapter titled "User Alert Listings" for details.

Query Design

Before you design a query for use with a dashboard, you need to ask the following:

Will the event using this query create a single dashboard (e.g., All Overdue Assignments), or multiple (personalized) dashboards (e.g., My Overdue Assignments) where the query will create a separate dashboard for each person?

One Event—One Dashboard

If an event is going to generate a single dashboard, you should hard-code the location and name of that dashboard within the query itself.

Take an example of an "All Overdue Assignments" dashboard that displays a list of all overdue assignments. You might decide that the folder called "General" is where you wish to store this dashboard file and that you wish to call that output file "overdue_assignments". Here's how you would design the corresponding query:

1. Create a query that retrieves overdue assignments.

2. In the "Columns" tab, click on the button called "Add Calculated Column to Query".

3. In the Calculated Column Workbox, type in the following

   '(name_of_publishing_folder)'+'\'+'(name_of_output_file).htm'

As in:

'General'+'\'+'overdue_assignments.htm'

The above command tells Perspective Workflow to create the dashboard file in the "General" folder, and to give it a name of "overdue_assignments".

4.   Click OK to return to the "Columns" tab.

5.   Go to the "Customized Name" of the column you just added and change the customized name to "dashboard_address".

6.   Preview the query to make sure that the "dashboard address" field shows up as:

General\overdue_assignments.htm

7.   Save and close the query.
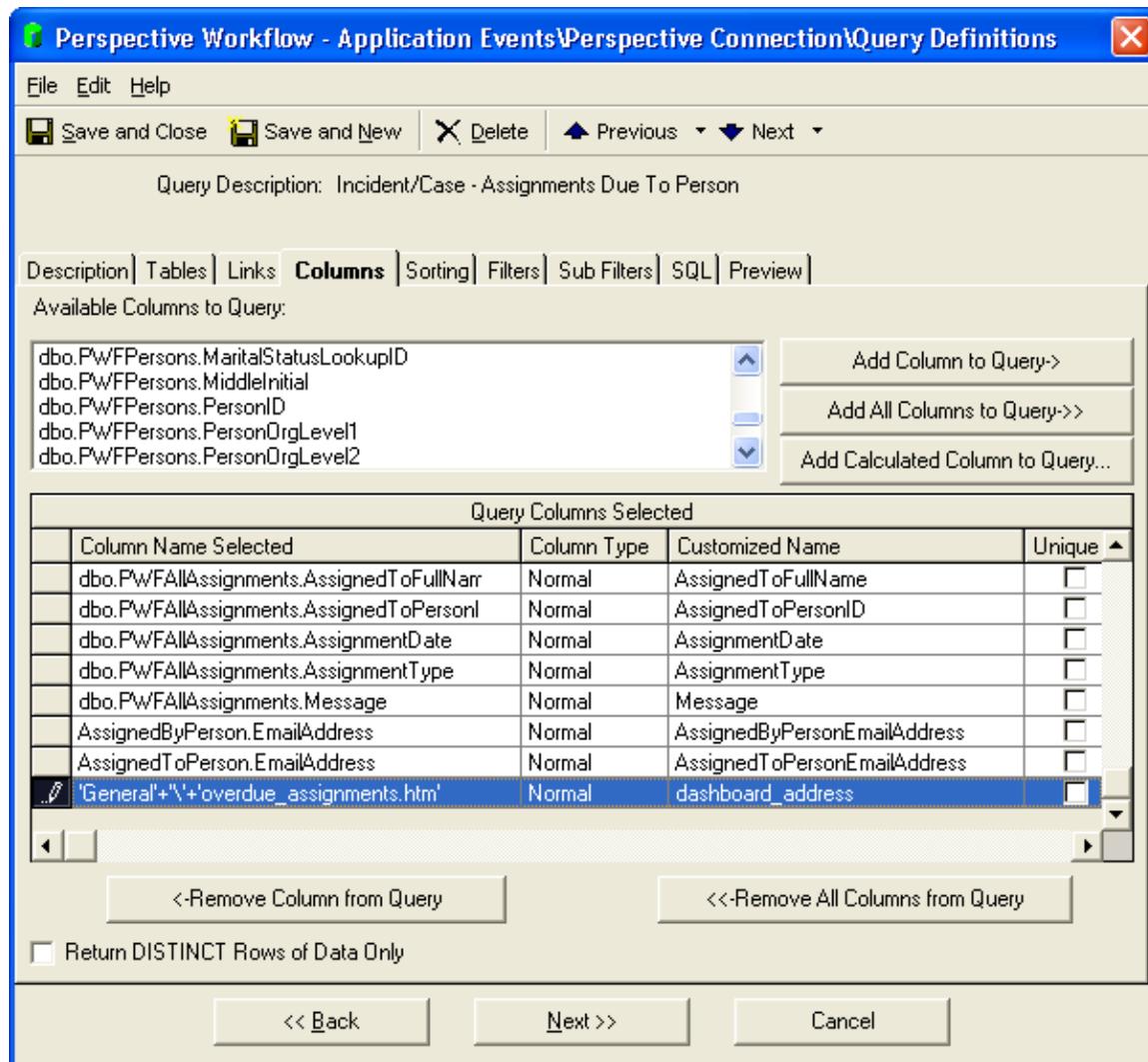
One Event—Multiple Dashboards

If an event is going to generate multiple dashboards (user-specific, region-specific, etc.), you will need to embed <u>variables</u> within the query's dashboard address column.

Using the example of the "My Overdue Assignments" dashboard, let's say you want to create one dashboard for each user who has overdue assignments and you have users named Farber, Smith and Jones. You've already created a publishing location folder for each of them.

Now consider the query; each assignment is associated with a user (the three mentioned above) and each user's last name corresponds to a publishing location. So, all you need to do is to tell Perspective Workflow to create a separate dashboard for each user who has overdue assignments.

You would create a calculated column, and its format would again be as follows:

'(name_of_publishing_folder)'+'\'+'(name_of_output_file).htm'

But instead of hard-coding the name of the publishing folder (as previously detailed), you would use a query database field to control the name of the folder in which the dashboards will be created, as in:

'dbo.PWFAllAssignments.AssignedToLastName'+'\'+'overdue_assignments.htm'

"'dbo.PWFAllAssignments.AssignedToLastName" is the field that contains the last name of the user to whom an assignment is assigned—and also the name of the folder in which you want each dashboard to be created. Perspective Workflow will automatically create the appropriate dashboards in the appropriate locations based on the records retrieved by a query.

(And so, if 3 users had overdue assignments, Perspective Workflow would create three dashboard output files, one in each of the 3 corresponding publishing location folders, and each file would be called "overdue_assignments".)

Queries that create multiple dashboards <u>must</u> include a "Sorting" field that groups the matching records by dashboard recipient. Thus in the above example, the query also includes a sorting field on the user's last name.
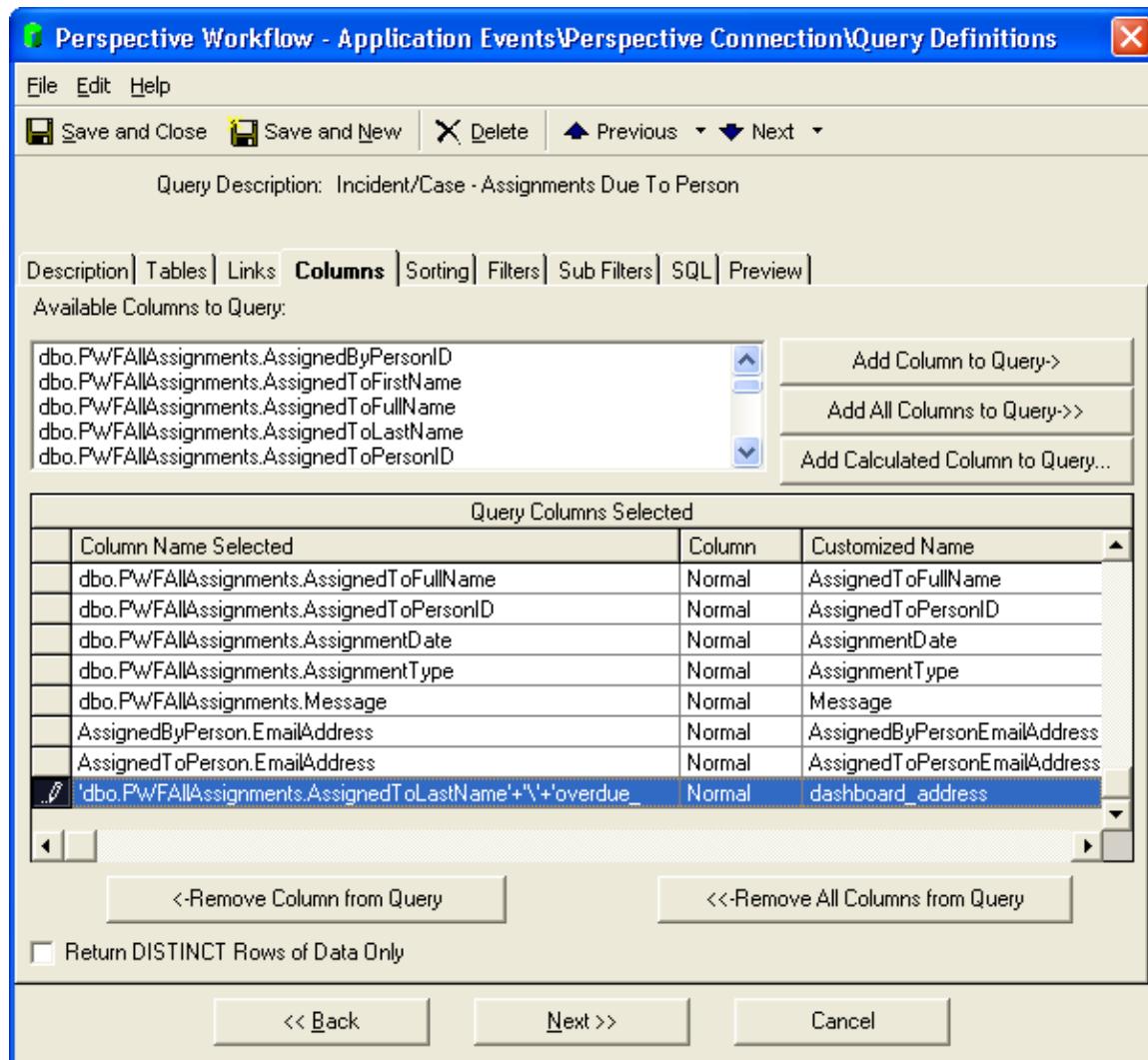
Dynamically Naming the Dashboard Output File

In addition to dynamically determining the publishing location of dashboard output files, Perspective Workflow also lets you dynamically name the dashboard output file itself.

In the example from the preceding section, 3 users named Farber, Smith, and Jones would each have a dashboard file called "overdue_assignments" in their corresponding folder. But what if you wished to precede the name of each dashboard output file with the name of the user?

It's easy. Just modify the dashboard address column as follows:

(database_field)+'\'+(database_field)+'(name_of_output_file).htm'

As in:

dbo.PWFAllAssignments.AssignedToLastName+'\'
+dbo.PWFAllAssignments.AssignedToLastName+'_overdue_assignments.htm'

Now the user named Farber will have a file called "farber_overdue_assignments" in his folder, and the other users will have correspondingly-named dashboards as well.

Choosing a Specific Dashboard Template

(You may skip this section if you are using a single dashboard template.)

Earlier in this chapter, it was mentioned that you can create multiple dashboard templates. If you do have multiple templates, you can control which template the query's resulting dashboard will use by modifying the dashboard address column as follows:

'(template_location_name):'+'(publishing_folder)'+'\'+'(name_of_output_file).htm'

As in:

'Dash_ext:'+'General'+'\'+'overdue_assignments.htm'

This syntax will create a dashboard called "overdue_assignments" in the "General" folder beneath the publishing location of the dashboard template (Webcast location) record called "dash_ext".

Other Query Design Considerations

Consider the elements of data you wish to display within a dashboard. Dashboards display their data in a columnar format, and the number of data elements you can include in such a table is limited only by the size of the fields and the display capabilities of your monitor. (You can also adjust the font size of the data in the dashboard table.)

Regardless of how many data elements you wish to display, make sure your query has selected each of those data elements as "Columns" for the query. Only those columns that are selected for a query can be later put into a dashboard.

Keep in mind that dashboards can also contain calculated data.

Configure Dashboard Event

To specify the content of a dashboard, create an event that uses the query you designed, and then click on the "Webcast" tab in the Event Designer.

The <u>Webcaster Subject</u> will typically be a description of the overall event, such as "Overdue Assignments".

The Webcaster Message is where you specify the contents of your dashboard. Dashboards are typically formatted to display their data in a table (columnar) manner; since this data will be shown in an HTML page, the Webcaster message must be defined using HTML syntax.

You may use any HTML editor to create or customize the Webcaster content; if you do not have an HTML Editor (or are not HTML-savvy), PPM 2000 suggests that you use the following free, non-technical HTML Table Design tool available on the Internet:

http://www.spectrum-research.com/V2/generators/tableframe.asp

A standard Webcaster message content template follows:

```
<style type='text/css'>

        caption.mytable

        {

                background-color:99CCFF;

                color:black;

                border-style:solid;

                border-width:1px;

                border-color:336699;

                text-align:center;

        }


        table.mytable

                {
```

```
        font-family:Tahoma;

        border-collapse:collapse;

        font-size:10pt;

        background-color:white;

        width:100%;

        border-style:solid;

        border-color:336699;

        border-width:1px;

}


th.mytable

{

        font-size:8pt;

        color:black;

        text-align:center;

        font-weight:bold;

}


tr.mytable

{

}


td.mytable
```

```
        {

                font-size:8pt;

                background-color:white;

                color:black;

                border-style:solid;

                border-width:1px;

                border-color:cccccc;

                text-align:left;

                padding:3px;

        }

</style>


<table class='mytable'>

        <caption class="mytable">{EVENT_DESCRIPTION_COLOR} as of
{EVENT_DATE}</caption>

        <thead>

                <tr class='mytable'>

                        <th class='mytable'>Heading 1</th>

                        <th class='mytable'>Heading 2</th>

                        <th class='mytable'>Heading 3</th>

                        <th class='mytable'>Heading 4</th>

                </tr>

        </thead>
```

```
        <tbody>

                {BEGIN*REPEAT}

                <tr class='mytable'>

                        <td class='mytable'>{Data Field 1}</td>

                        <td class='mytable'>{Data Field 2}</td>

                        <td class='mytable'>{Data Field 3}</td>

                        <td class='mytable'>{Data Field 4}</td>

                </tr>

                {END*REPEAT}

        </tbody>

</table>
```

The variable {EVENT_DESCRIPTION_COLOR} contains the name of the dashboard event and {EVENT_DATE} contains the date and time the event was last run.

Note that the details section of the HTML uses {BEGIN*REPEAT} and {END*REPEAT} so that all matching records will be displayed within the dashboard that is created. (Remember that the "repeat" commands may appear on only one tab within an event.)

Expiration Days

The field called "Expiration Days" controls the number of days that information will remain in the Dashboard. Typically users do not want dashboard information to remain in the display unless the corresponding business conditions remain in existence.

An expiration days setting of minus one (the suggested setting) tells Perspective Workflow that each time the dashboard event runs, its contents will be refreshed with only those records that meet the event's criteria.

Linking a Report to a Dashboard

Dashboards may be created to include URL links to Crystal Reports.

To link a report to a dashboard event, follow these steps:

1.   Create the report in Crystal Reports.

2.   In Perspective Workflow, add a "Report Definition" for the report.

3.   Open the dashboard event, go to the "Reports" tab and add the corresponding report. Select an output format and fill in any required report parameters.

4.   Go to the "Webcast" tab and place a checkmark in the option boxes titled "Include reports as URL links" and "Webcast notifications should wait until reports are completed".

The last step in linking a report to a dashboard is the process of specifying where—in the dashboard—you want the link to the report (referred to as the "report reference field") to appear. One option is to have the reference field appear as a link in the title (or "caption") of the dashboard.

The report reference field is called {EVENT_URL}. Do not put it anywhere between your "repeat" commands.

Repeat-Enable the Dashboard Event

Since you want to make sure that every time a dashboard runs, Perspective Workflow will show all matching records make sure that the event is repeat-enabled by clicking on the "Description" tab of the event and checking to the option to "repeat notifications".

Dashboard Subscribers

With the exception of user alert listings, dashboard events do NOT use "Standard Subscribers". This is because the queries that power a dashboard event already contain the location and name of the dashboard output files; all you need to do is to specify the name of the query field that contains the dashboard location and name information.

(In the example from earlier in this chapter, the query column where this was stored was called "dashboard_address".)

Thus you would do the following to select the dashboard subscriber:

1.   Click on the "Subscribers" tab and then on the "Advanced" tab.

2. Go down to the last field in the lower grid ("Contains Webcasting name") and click in this field. A list button will appear.

3. Click on this button and choose the field called "dashboard_address".

Schedule the Event

Similar to any other event, go to the "Schedule" tab to specify how often a dashboard event runs. Note that the frequency of running will determine how often this event updates its display with new or changed data.

Run a Dashboard Event

To run a Dashboard event once—right now—follow these steps:

1. In the Navigator, locate and right-click on the dashboard event.

2. Choose the option called "Schedule This Now".

Once the event has been submitted, open the Monitor to track its status. Begin in the "Application Events" branch to see that the event has gone from "Checked Today" to "Triggered Today" (assuming that the event's conditions have been met).

Once triggered, you can highlight the event and click on the "Deliverables" button to see that the event has triggered the creation of a Webcast dashboard. You can then go to the "Webcast Delivery" branch and look at the "Pending", "Sent Today", or "Errors" branches to see the status of the generation of your dashboard.

User Alert Listings

A second use for dashboards is as a display of all of the alerts sent to a user.

In this configuration, a user would typically have a single dashboard window which would list all of the alerts from the events that the user wishes to be informed about.

Because such a window could contain a wide variety of event data, the design of such a window is typically very generic. A sample template (called "KS_Webcaster.htm") is included in the "Webcaster" folder. Typically this same template would be used for any users who wish to have access to this display of their own triggered alerts.

Like all Dashboards, User Alert Listings are self-updating so newly-triggered events will automatically be added to the displays. User Alert Listings are also an excellent way to deliver Forms, Documents, and Reports to the users viewing these listings.

Subscribers

Once you have created the publishing locations, you can define the address for each subscriber who will receive a user alert listing dashboard.

1. In the Navigator, expand the "Subscribers" branch, and locate the subscriber whose address for their user alert listing you wish to define.

2. Go to the "Webcast" tab for the selected subscriber.

3. In the "Webcaster Name" field, type the name of the Webcast folder in which the alert listing will be created. (Do not enter the entire path; just the publishing folder name.)

4. In the "Webcaster Location" fields, click on the drop-down arrow and select the dashboard template (here referred to as the "Webcast location").

5. Save and Close your entry when done.
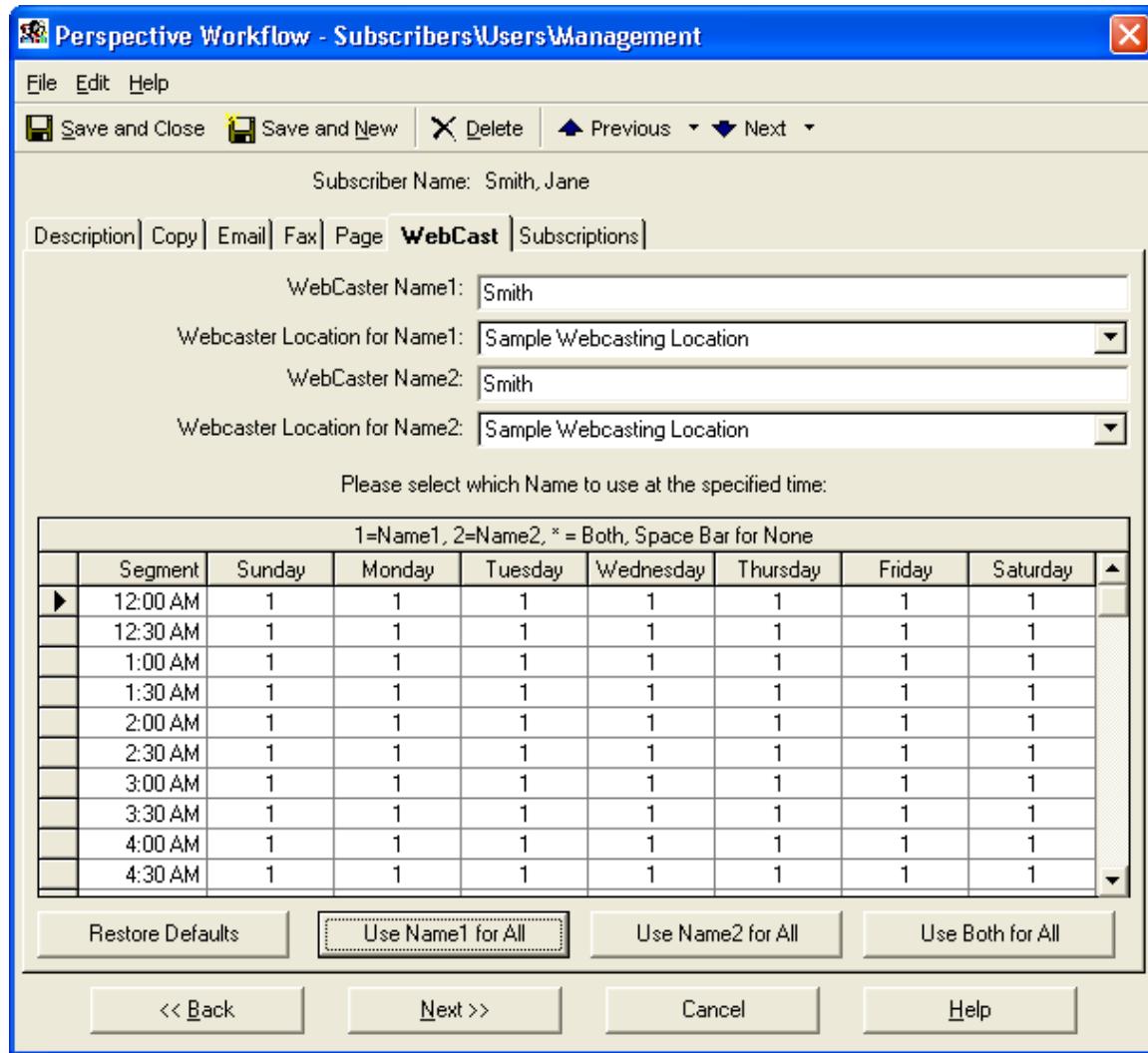
For any event you wish to update a subscriber's User Alert Listing, go to the Subscribers tab of the corresponding event, choose the "standard" subscriber whose listing you wish to update, and place a checkmark in the "Webcast" delivery option.

How User Alert Listings are Populated

When an event that updates User Alert Listings is triggered, Perspective Workflow automatically creates or updates the corresponding dashboard file and publishes it to the corresponding location of each subscriber.

When additional events are triggered, Perspective Workflow automatically re-creates the user alert list dashboard file, including both the existing alerts and the details of any newly triggered events. (Existing alerts will continue to be listed on a subscriber's alert listing dashboard until the alert's expiration date and time has arrived.)

One of the most powerful aspects of user alert listings is that unlike email, a subscriber may keep a window (Web browser) open to their specific alert listing location and receive real-time updates about newly-triggered events.

Dashboards for Report Distribution

In addition to using dashboards to publish triggered event details, this module is also an excellent way for an organization to distribute reports and files to large numbers of recipients.

For example, consider an organization using email to send 100 copies of a report to the appropriate recipients. With Perspective Workflow, you could attach the report (as a URL link) to one or more dashboard "reports portals". You could then use email to notify each recipient of the availability of the reports, even including the appropriate dashboard URL link within an outgoing email alert message.

To use the dashboards in this manner, specify one or more reports and/or files for an event you are working with. Then, on the "Webcast" tab, be sure to check the box titled "Include Reports as URL Links." Once you do so, the corresponding reports and/or files will automatically be generated and posted to the resulting dashboard window.

Note: Please make sure you close any Workflow modules at the end of the day so that Workflow can do its nightly scheduled maintenance.

Contact Information

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