SeriesSlot Text Annotations in RiverWare

Requirements and High-Level Design

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This document defines the requirements for, and outlines a possible design for a new ability in RiverWare to add brief Text Annotations to Timesteps on SeriesSlots.

0.1 Document Status

1-20-2006: Ready for review.
2-13-2007: Added design notes for model file persistence; SimObj & Account export/import; and DMI I/O.

0.2 Table of Contents

1.0 Requirements

RiverWare users have expressed an interest in being able to add brief text notes to specific timesteps on certain sets of SeriesSlots. These text notes are for annotation only -- they do not effect the running of the model, and cannot be accessed via Rpl.

These specific requirements have not yet been reviewed.

1. Text Annotations should be viewable and editable within Open SeriesSlot dialog boxes, with one Text Annotation per timestep row.
2. There should be some support for Text Annotations in the SCT.
3. Text Annotations should be persistent in RiverWare model files.
4. Text Annotations should optionally be supported in SeriesSlot data in SimObj and Account Import and Export operations.
5. Text Annotations should optionally be supported in (old style) DMI I/O operations.
6. It should be possible to centrally manage (create, view, edit, delete) all Text Annotations.
7. It should be possible to associate groups of Text Annotations with groups of Slots.

2.0 Data Model Overview

2.1 Annotation Groups

Sets of Text Annotations at particular timesteps need to be associated with sets of SeriesSlots. A modification to a Text Annotation in the context of one SeriesSlot needs to be reflected within all SeriesSlots associated with that Text Annotation.

An Annotation Group (C++ class AnnoGroup) is composed of four properties:

1. A name, generally provided by the user.
2. A text annotation icon color (one of eight basic colors -- similar to the support for Data Object icons).
3. A set of text annotations at particular timesteps, implemented as a map from absolute times (absolute seconds) to text strings.
4. A set of pointers to SeriesSlots (limited to those having GUI support for these new Annotation Items -- i.e. SeriesSlots supported by SlotQtDlg and related classes, including Account Series Slots).

There is no “Annotation Item” class. Each Annotation Item is represented as an element in a map indexed by absolute seconds, having a particular text string value. The Annotation Group effectively *owns* its Annotation Items.

An Annotation Group can contain only a single Annotation Item at any single timestep.

A given SeriesSlot can be referred to by one or more AnnoGroups. The AnnoGroup does not own the SeriesSlots it refers to. The AnnoGroup must be notified of deletions of SeriesSlots it refers to.

It would be preferable to refrain from having SeriesSlots refer to the Annotation Groups to which they belong. The one-way reference from Annotation Groups to Slots should be sufficient since modifications of Annotation Items will be supported only through the GUI (i.e. where performance concerns are less).

2.2 Annotation Group Manager

The Annotation Group manager (C++ class AnnoGroupMgr) is a singleton class which owns all of the Annotation Group (AnnoGroup) instances in the model. It implements services for insuring uniqueness of AnnoGroup names, retrieving particular AnnoGroups by name, and for iterating over all of the defined AnnoGroups.

See also discussion of the Annotation Group Manager Dialog in a subsequent section.

2.3 Experimental AnnoGroup and AnnoGroupMgr classes

Experimental C++ classes have been implemented in the following files.

Sim/AnnoGroup.hpp
Sim/AnnoGroup.cpp
Sim/AnnoGroupMgr.hpp
Sim/AnnoGroupMgr.cpp

These classes *do not* currently support persistence (in a RiverWare model file), or import or export capabilities. [Phil, 1-20-2006].

3.0 Persistence and I/O

3.1 Annotation Note Persistence in RiverWare Model File and Import/Export

Text Annotations (Annotation Groups, including references to specific SeriesSlots) will be unconditionally preserved in the RiverWare model file.

Also, SimObj and Account Importing and Exporting will optionally support Text Annotations. (These features use the same low-level mechanisms as model saving, including loading using "Tcl"). Inclusion of Text Annotations in Export operations (and maybe also Import operations) will be optional, based on a toggle button. On Importing, Text Annotation **collisions** (i.e. loading an annotation at a particular Absolute Date_Time into an Annotation Group which already has an annotation at that Date_Time) will at least be reported. (As development time permits, the user will be presented with choices about how to handle collisions, i.e. "overwrite" or "skip").

The following will be added to the RiverWare model file format (which applies also to SimObj and Account export files):

1. **Annotation Group Records** (before SimObjs and Accounts in the model file). Each Annotation Group Record contains the following information:

- Annotation Group Index (relevant only in subsequent references from Slots, see below)
- Annotation Group Name (user-entered text string)
- Annotation Group Icon Color (one of eight basic colors)
- List of Absolute Date_Time / Annotation String pairs (probably, one per line).

2. **Added property to SeriesSlots:**

- List of Annotation Group Indices (identified in the Annotation Group Records, above).

3.2 DMI I/O

Text Annotations will be supported in DMI operations -- but initially, only in "old-style" DMIs (i.e. External program / Control File-based), and not in the new "Direct Database Connectivity" DMIs (developed in late 2006 / early 2007 for DSS and HDB).

LIMITATION TO BE REVIEWED (as of 2-13-2007): **"Lossy Annotation Collisions"** ... Only one Text Annotation will be supported at one given timestep on any one SeriesSlot. (This is the same limitation as that for display of annotations in the GUI). That is, if a given SeriesSlot is a member of more than one (say, two) Annotation Groups, and if both of those Annotation Groups have an annotation item at the same timestep (say, 2-13-2007), then only ONE of those Annotations will be preserved in the DMI operation. A design formulated to overcome this limitation would be significantly more complicated to implement.

The limitation described above makes possible the **inclusion of the Annotation Text right on a series value text line,** instead of having to formulate and cross-reference a completely distinct record.

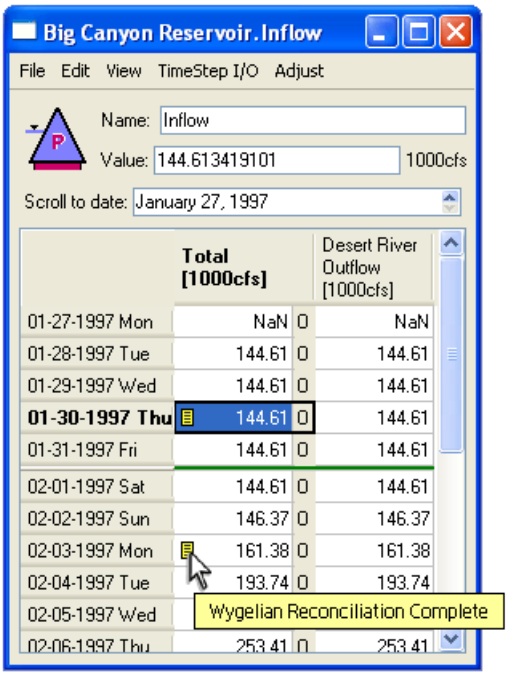
Format: To each TimeStep Value line, the following two fields will be added, with appropriate delineation and escape sequences:

1. Annotation Text (only one item).
2. Annotation Group Name (only one).

4.0 Display of Annotation Items

4.1 Open SeriesSlot dialog: Annotation Item Display and Editing

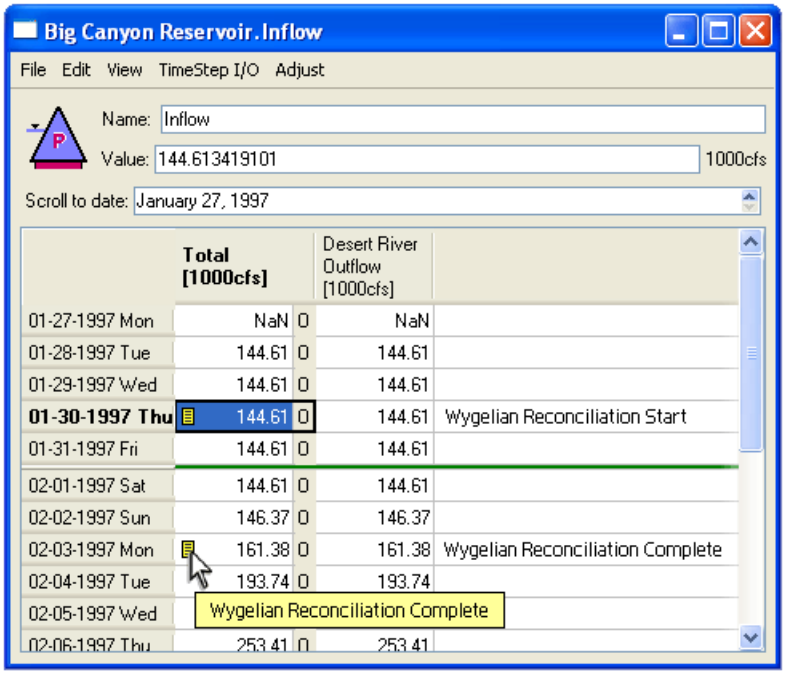
In the new Qt-implemented SeriesSlot dialogs (for SeriesSlots, AggSeriesSlots, MultiSlots, and for TableSeriesSlots), there will be a way of showing or hiding a right-most Text Annotation column. Additionally, timestep rows having a Text Annotation will show an icon indicating the presence of the annotation (i.e. regardless of the visibility of the annotation column) -- Hovering over that icon with the mouse will cause the text to be momentarily displayed in a Tool Tip (text bubble popup).



For SeriesSlots having more than one Series "column," an Annotation Item is associated with a particular timestep on *the overall SeriesSlot* -- not on a particular Slot column of the Slot. Even though such Slot columns are sometimes actual SeriesSlots (i.e. in the case of AggSeriesSlots and MultiSlots) -- it will not be possible to associate Annotation Items with one of those subordinate Slots. Only the overall top-level SeriesSlot can have Annotation Items.

Open SeriesSlot Dialog, Graphical Mockups ...

These mockups don't show a GUI control for showing or hiding the optional annotation column. Minimally, a toggle will be added to the View menu.



When the annotation column is displayed, the user can add an annotation at a particular timestep (in a particular row) by typing directly into the annotation column cell.

If the Slot is associated with exactly one Annotation Group, then the item is added to that group. Otherwise, the user will have to indicate the Annotation Group to be used -- with an emphasis on the Groups already associated with the SeriesSlot.

4.2 SCT: Annotation Item Display

Initially, the SCT will support only the Annotation Item Icon with Tool Tips (mouse hover “text bubbles” popups). *See the OpenSeries Slot Dialog mockups in the previous section.*

To add or modify an existing Annotation Item, the Annotation Group Editor will be used, with the new or existing item selected for modification. The adding, deleting or modification of the item will be initiated with a “context” (right-click) menu operation, also available in the SCT menu when a single Slot / Timestep cell is selected.

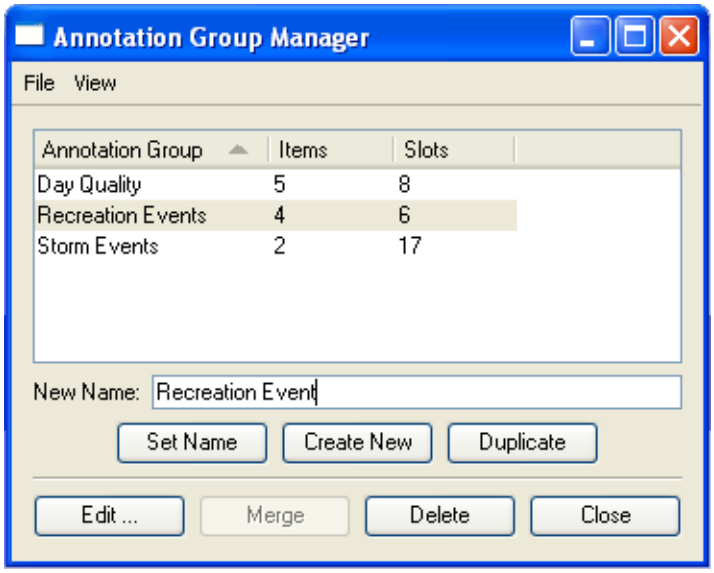
5.0 Annotation Group Management

Two new dialog boxes will be used to manage the set of Annotation Groups and the set of Annotation Items within each Group.

1. Annotation Group Manager Dialog
2. Annotation Group Editor

5.1 Annotation Group Manager Dialog

The Annotation Group Manager Dialog provides a summary of all of the Annotation Groups in the model. It lists one Annotation Group per line, along with an indication of the number of Annotation Items in each group, and the number of SeriesSlots associated with each group.



Double clicking on any Annotation Group row opens up the Annotation Group Editor (see next section) for the indicated group.

The **“New Name” text entry line** is used for various Annotation Group operations. When the user clicks on an Annotation Group row in the listview, the name of the selected group is assigned to the “New Name” text entry widget.

Operations on Annotation Groups (shown as buttons in the mockup image) include:

Set Name: Set the name of the single selected Annotation Group to the text in the New Name text entry line.

Create New: Create an empty Annotation Group named from the text in the New Name text entry line.

Duplicate: Create a new Annotation Group having the name of the text in the New Name text entry line, with all of the Annotation Items and Slot references from the single selected Annotation Group (selected in the listview).

Edit: *(same as double-clicking on an Annotation Group row in the ListView)* ... open up the Annotation Group Editor *(see next section)* for the single selected group.

Merge: Copy all of the Annotation Items and Slot references from the selected Annotation Groups into the Annotation Group named in the "New Name" text entry line. If that name is, in fact, one of the existing Annotation Groups, then that named group receives the copied items and Slot references. Otherwise, if the name doesn't correspond to an existing group, then a new Annotation Group is created. If two or more of the "source" groups have an Annotation Item at the same timestep, then only one of those items is copied into the target group at that timestep.

Delete: Delete the selected Annotation Groups. A confirmation dialog box is shown to allow the user to abort the deletion operation.

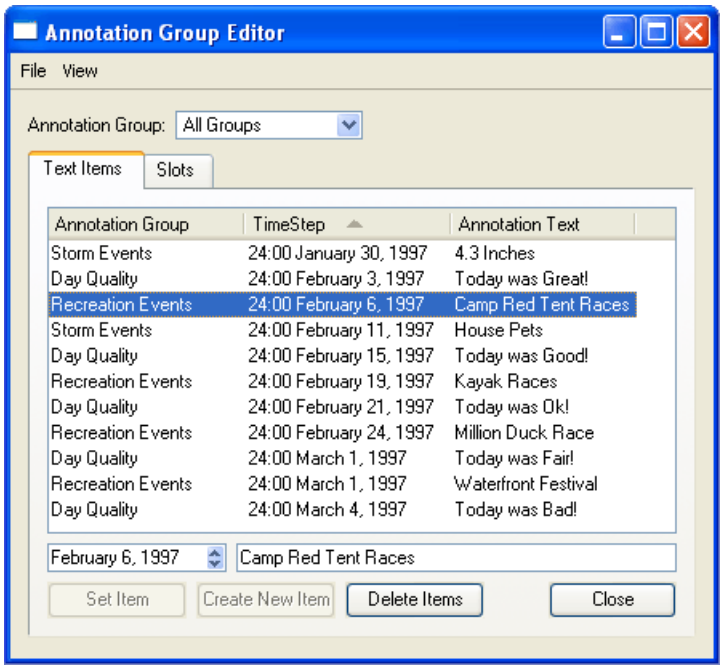
Close: Closes the dialog box.

These operations are appropriately enabled or disabled depending on the number of Annotation Group selections in the listview, and on the New Name text entry value -- i.e. whether or not the text matches either the selected Annotation Group, or any existing Annotation Groups in the model (depending on the operation).

5.2 Annotation Group Editor

The Annotation Group Editor can show either:

- All of the Annotation Items in the model, or
- All of the Annotation Items within *one particular* Annotation Group.



The Editor has two tabbed panes:

- Text Items *(image to the right)*
- Slots *(see image below)*

The **Text Items tabbed pane** has two entry widgets for operations on individual Annotation Items:

- A Date_Time (timestep) Spinner
- A text entry line, for the actual Annotation Text.

When the user clicks on an Annotation Item row in the listview, the Date_Time (timestep) of the selected item is assigned to the Date_Time spinner, and the text of the selected item is assigned to the text entry line.

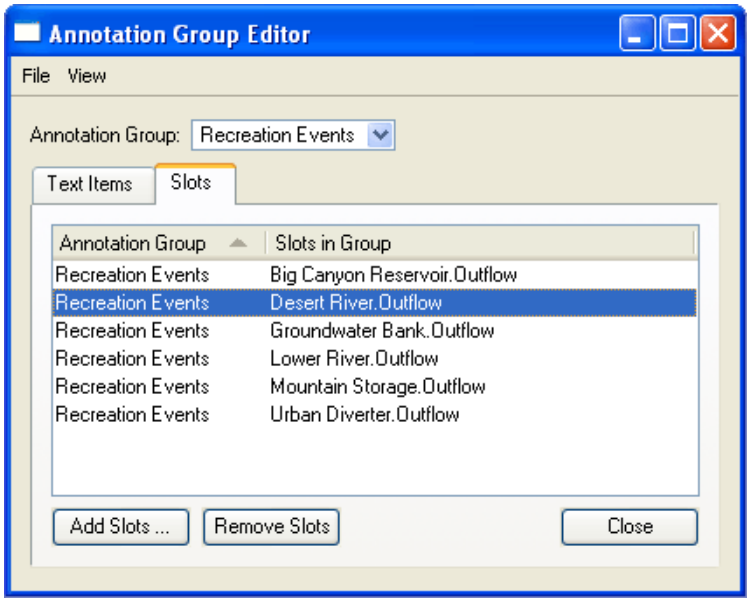
Operations on Annotation Items *(shown as buttons in the mockup image)* include:

Set Item: This is enabled only if a single item is selected, and if either the Date_Time value or the text entry line differ from those values of the selected item. This operation assigns the values of the input widgets to the selected item. Technically, if the Date_Time is being changed, the selected Annotation Item will be deleted, and a new one will be created at the Date_Time indicated by the Date_Time Spinner.

Create New Item: This is enabled only if the dialog box (the Annotation Group Editor) is set to show the items of only a single Annotation Group, and if that group doesn't have an Annotation Item at the Date_Time specified by the Date_Time Spinner. It creates a new item from the values of the input widgets within the selected Annotation Group.

Delete Items: This operation deletes the Annotation Items selected in the listview. A confirmation dialog box is shown to allow the user to abort the deletion operation.

The **Slots tabbed pane** of the Annotation Group Editor shows the Annotation Group / Slot associations for either the single indicated Annotation Group, or for all Groups in the model. *(See the image to the right).*



When "All Groups" is selected in the Annotation Group combo box, Slots which are *associated with more than one Annotation Group* will be shown in several rows: one row for each associated Annotation Group. For the purpose of examining this condition, it will be useful for the user to sort the list by the "Slots in Group" column (by clicking on that column header).

The **"Add Slots"** operation (enabled only when a single Annotation Group is selected) brings up the GUS Slot Selector to select more Slots to be associated to the group. Slots selected with GUS which are already in the group are ignored. GUS will present to the user only SeriesSlots for which Annotation Items are supported. (In the initial development, Accounting Slots will be excluded).

The **"Remove Slots"** operation removes the selected Annotation Group / Slot associations. A confirmation dialog box is shown to allow the user to abort the removal operation.

The **"Close"** operation closes the dialog box.

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