



# Software Development, Maintenance, Releases and Tech Transfer

---

Presenters: Bill Oakley and David Neumann

2013 RiverWare User Group Meeting  
August 27, 2013

# Software Development Team

- Professional software engineers
  - Continuity and institutional knowledge
  - Variety of complimentary backgrounds
- Professional water resource engineers
  - Engineering methods
  - User support
- Professional support staff
  - Software configuration management (licensing, releases)
  - Hardware maintenance

# Software Development Process

- Our goal is to deliver professional quality software applications which meet our users' needs:
  - Requirements analysis
  - Requirements document
  - High level design document
  - Estimates
  - Other documents as appropriate
  - Document reviews

# Software Development Process

- Implementation
  - Write code
  - Unit test (may include writing test code)
  - Peer code review (correctness, efficiency, coding standard conformance, readability, maintainability),
  - Integration testing (including regression tests, memory analysis)

# Software Maintenance

- Bug fixing
  - Critical bugs fixed for next patch release
  - Non-critical bugs deferred to next major release
  - Before major release thorough review of bug list to identify bugs to fix for release
- RiverWare development requires many software packages:
  - Applications or libraries
  - Commercial
  - Open Source
  - Home Grown (Java, Perl, Python, Tcl/Tk)

# Software Maintenance

- Operating Systems:
  - Windows: XP, Vista, 7, 8
- RiverWare Functionality: Qt (with WebKit), Qwt, CPLEX, Concert, GDAL/OGR, FlexLM, Reprise, HecGen, heclib, Oracle, MODFLOW, Tcl
- Source Control, Regression Tests, Releases: Git and Git Extensions, rw-rt, modelcomp, InstallShield
- Compilers, Debuggers, Performance Analysis: Microsoft Visual Studio, Intel Fortran, Rational Purify and Quantify, DevPartner BoundsChecker
- Bug Tracking, User Support: Gnats (moving to Bugzilla), Perl CGI scripts, SupportTool
- Web Pages, Online Payment System: DreamWeaver, Photoshop, Perl and Python CGI scripts

# Software Maintenance

- Many pieces to the puzzle and many dependencies between the pieces
- New versions of third-party software are continually released
  - Monitor and evaluate new versions
  - New versions may be compatible with RiverWare or they may require substantial RiverWare code changes
  - New versions may affect other third-party software
  - Estimate effort and schedule upgrade to new version, keeping in mind release schedule
- Keeping current requires significant effort

# Recent Software Maintenance Activity

- Moved from CVS and TkCVS to Git and Git Extensions (*You can teach old developers new tricks*)
- Migrated from Visual Studio 2008 to Visual Studio 2010
  - Updated third party libraries when appropriate
- Qt4 Port

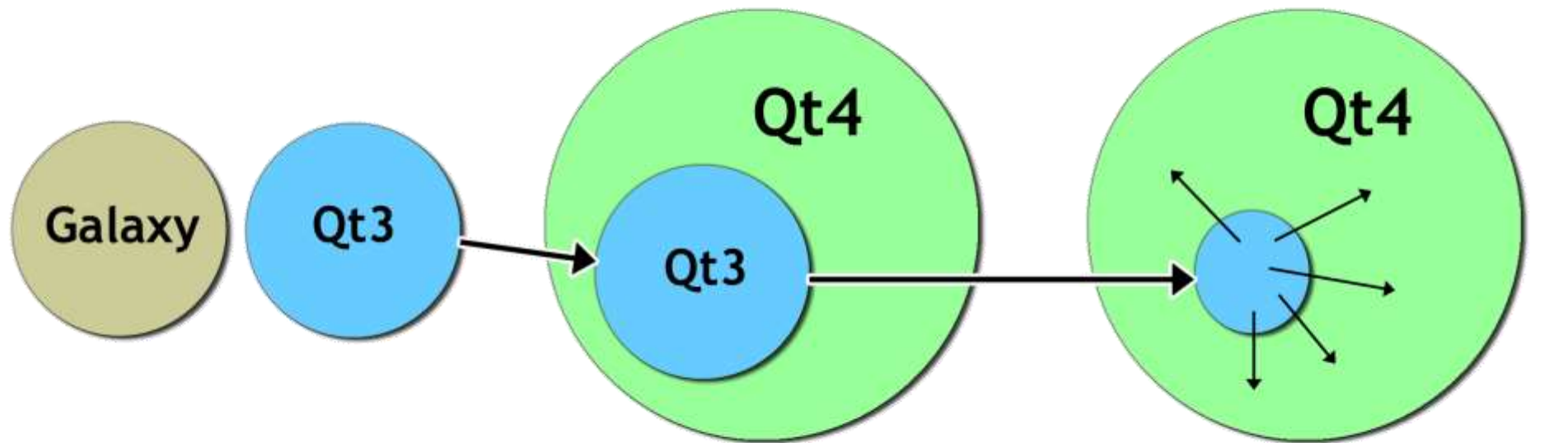


# Our Qt Porting Road Map

RiverWare 4.9

RiverWare 5.0

Current  
Porting Work



Mix of Galaxy  
and Qt3 Libraries

Qt4 with the Qt3  
Compatibility Library

Removal of the Qt3  
Compatibility Library

# Qt3 to Qt4 Port Status

- Done!
- Release 6.4 will be “Qt3 Free”
- Qt 4.8.5 without the Qt3 Compatibility Library



# User Support Procedure

- All user support questions should be sent to:  
riverware-support@colorado.edu
- Multiple support staff receive email and most appropriate or available person can respond
- Must have purchased time!

# Releases

- Typically two releases each year, with additional patch releases as necessary
- Numbering: RiverWare Major.Minor.Patch where
  - Major = major version number (currently 6)
  - Minor = minor version number (currently 3)
  - Patch = patch level number (currently 2)
- Download from the web site:  
<http://www.riverware.org>

# Releases

- Major releases: RiverWare 6.3
  - Fully tested and verified (usually including a pre-release)
  - Include updated online documentation and release notes
  - Users notified by e-mail and encouraged to upgrade
- Patch releases: RiverWare 6.3.2
  - Generated from last full release with minor enhancements
  - Tested and verified (usually without a prerelease)
  - May include updated online documentation
    - Usually minor enhancements/fixes mentioned in email (also under “notes” link on web site)
  - Users notified by e-mail but may choose not to upgrade

# Snapshots

- Development snapshots:

## RiverWare 6.4 Development

- Generated from previous night's development area
- Should only be used to test new development  
Should NEVER be used for operations or model building
- Only tested by overnight regression tests
- Does not include updated online documentation or notes
- Concerned users are notified by email

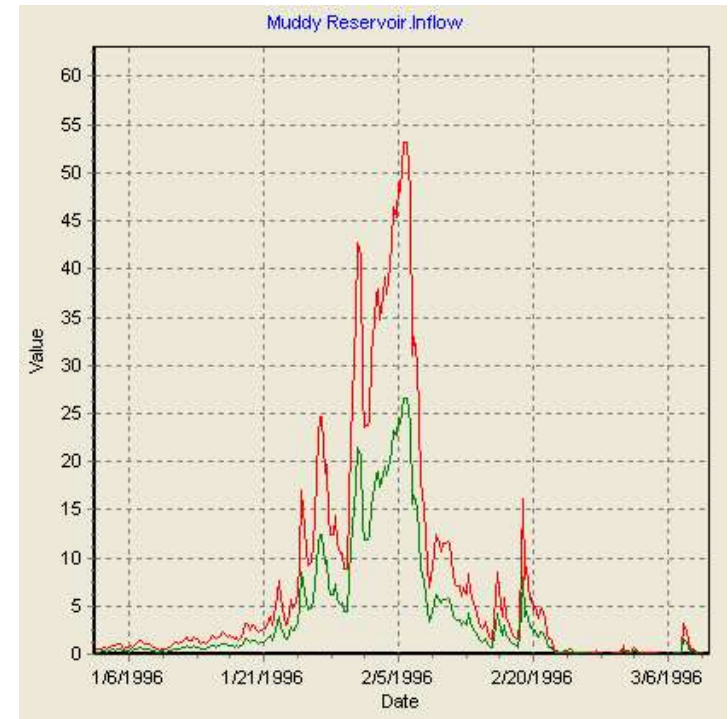
# Other Tools available

## Modelcomp – RiverWare model comparison tool

### Execute from command line

```
modelcomp model1.mdl model2.mdl
```

- Model files are compared line by line
- Slot differences include convergence check
- Graphing Options
  - Both sets of data (-g)
  - Differences only (-d)
  - Scaled Differences (-s)
- Largest differences are shown first



# Other Tools available

- GPAT – Graphical Policy Analysis Tool
- RdfToExcel
- RdfAnnualizer
- YAPP – Yearly Aggregation Post Processor
  
- All are available on website



# Bugs

- Filing Should be done by users, even if CADSWES verifies
- Current licensees login to:  
<http://cadswes2.colorado.edu/downloads/riverware/issuetracking/index.html>  
Log in as: rwuser  
For password contact RiverWare tech support:  
[riverware-support@colorado.edu](mailto:riverware-support@colorado.edu)

# Bugs

- Include information to reproduce the bug
  - Events leading to the bug
  - Exact text of any errors or messages
  - Model, ruleset, and/or dmi in which bug is manifested
  - Send model to:  
riverware-support@colorado.edu
  - Ftp models to:  
ftp://cadswesftp.colorado.edu/incoming/riverware

# Bugs

- Bug follow-up
  - Filer is contacted by automated email
  - Bug tracking system notifies filer when status changes (closed, info added, reassigned)
  - Web lookup available
  - Closed bugs documented in release notes or patch email

# New Bug Tracking Software

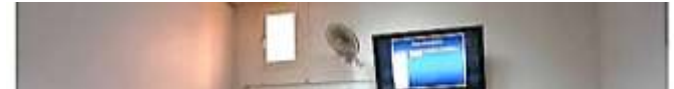
- Will be converting from GNATS to Bugzilla
  - GNATS no longer actively maintained
  - Homegrown Perl scripts for Gnats web interface are limiting and difficult to maintain
  - Bugzilla is an active open source software
  - Bugzilla can provide additional capabilities such as filing a model file along with the bug

# Training

- Intro to Simulation
- Rulebased Simulation
- Accounting
- Optimization

# New Class

- Introduction to RiverWare
  - Three day overview of both Simulation and Rules
  - Offered this summer in
    - Sudan,
    - Ethiopia, and
    - Egypt



# New Demo/Evaluation Modules

- Designed to showcase RiverWare's capabilities and interface
- 1. Simulation in RiverWare**
    - Opening a model
    - Timestep and controller information
    - Navigation
    - Object Types
    - Methods and slots
    - Running
    - System Control Table
    - Model Report
    - DMI
  - 2. Rulebased Simulation**
    - Functions and rules
    - RPL Editor and Palette
    - Diagnostics and debugger
  - 3. Multiple Run Management**
    - Inputs to MRM
    - Running an MRM
    - Outputs from MRM runs