NICOS System of Nightly Builds for Distributed Development

Alexander Undrus

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Purpose of NICOS

- NIghtly COntrol System
- Provide flexible nightly build system for coordination of distributed development
- Test new software submissions
- Send immediate feedback to developers
- Facilitate multi-person, multi-platform development of code
- Ensure maximum stability of build processes
Flexible Build System

- Based on experience gained in software management of large HEP projects (CLEO, ATLAS)
- Operates on UNIX-like platforms (adaptation for Windows is planned)
- Works with popular release tools (CMT, SCRAM, SRT)
- Provides options for version management
- Allows optional number of releases in a cycle
Software Testing

- Unit tests supported by release tools
  - Success is determined by the return value of a test
- Integrated tests defined at NICOS configuration. Success criteria:
  - Critical patterns in the output
  - Comparison of histograms (under development)
Informing Developers

- NICOS dynamic web pages
  - Detailed status of builds is displayed on the project web page
  - Build summary web pages display results for individual packages and integrated tests

- Responsible developers are notified about problems via e-mail
Stability of builds

- Build process is divided into steps
  - Current step is displayed on the project web page
  - If any step fails, NICOS Controller tries to restart from the point of failure
- Time limits are imposed for execution of steps
  - NICOS job can be automatically killed if runs overtime
NICOS Project Database

- XML-like file with configuration parameters
- Each build step is associated with Markup tag
- Markup tag with parameters is followed by commands for particular step

```xml
<project build dir=src>
  scram b
<error analysis>
  NICOS_MAIL="no"
</error analysis>
</project>
```
NICOS Packages Database

- Names of packages
- Method of CVS tag selection (for each package)
  - Exact tag
  - Latest CVS tag
  - Latest CVS tag with restrictions (e.g. starting with some string)
  - External script
- Addresses of responsible developers
NICOS Web Server

(available in 0.2 version of NICOS)

- Based on PHP scripts
- Version Administrator
  - Change conventions for tag selections
  - Change e-mail addresses of developers
  - Add/Delete packages
- Project Configurator
  - Configure project from internet
- NICOS Job Controller (in 0.3 version of NICOS)
  - Show status of builds, stop/start builds
- All actions require admin privileges
Example of NICOS Project Web Page
Example of NICOS Build Results Web Page

NICOS (Nightly COrntrol System) build results

Project: POOL
Release: POOL_RELEASE_6

Location: /afs/cern.ch/sw/lcg/contrib/releases/POOL/POOL_RELEASE_6/POOL_0_3_1
Tests and packages that are highlighted and marked with a red cross have problems
Click on names to see logfiles

Last modified Friday, March 14, 2003 19:41:24

Integrated tests results
integrated tests are not available for release POOL_RELEASE_6

Build results for individual packages

<table>
<thead>
<tr>
<th>Package name</th>
<th>Container</th>
<th>Build</th>
<th>Test</th>
<th>Manager(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td>N/A</td>
<td>✔</td>
<td>N/A</td>
<td>undrus</td>
</tr>
<tr>
<td>FileCatalog</td>
<td>N/A</td>
<td>✗</td>
<td>N/A</td>
<td>nobody</td>
</tr>
<tr>
<td>MySQLCatalog</td>
<td>N/A</td>
<td>✗</td>
<td>N/A</td>
<td>nobody</td>
</tr>
</tbody>
</table>
Example of NICOS Job Controller Page

NICOS (Nightly Control System): Job Controller

Platform Linux

<table>
<thead>
<tr>
<th>Working on release</th>
<th>Status</th>
<th>Release start</th>
<th>Step start</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>POOL_RELEASE_1</td>
<td>CODE CHECKOUT</td>
<td>03/16 01:41</td>
<td>02:03</td>
<td>Kill all processes, Restart (full), Redo current step</td>
</tr>
</tbody>
</table>

Platform SunOS

<table>
<thead>
<tr>
<th>Working on release</th>
<th>Status</th>
<th>Release start</th>
<th>Step start</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>POOL_RELEASE_0</td>
<td>COMPLETED</td>
<td>03/15 03:40</td>
<td>-</td>
<td>Start immediately, Do not build today</td>
</tr>
</tbody>
</table>
Example of NICOS Version Administrator Page

NICOS (Nightly COnrol System): Version Administrator

Project: POOL
Location: /afs/usatlas.bnl.gov/project/nightly/POOL

Current versions

<table>
<thead>
<tr>
<th>Package</th>
<th>Version</th>
<th>Author</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>DataSvc</td>
<td>DataSvc-01-00-02</td>
<td><a href="mailto:clever@univer.edu">clever@univer.edu</a></td>
<td>Edit, Delete</td>
</tr>
</tbody>
</table>

Add new package
Schedule

Three phases of NICOS development

Version 1
Version 2
Version 3

Jan Feb Mar Apr May Jun July Sep Oct Nov Dec

1. Basic functionalities
2. NICOS Web Master, replacing shell scripts
3. NICOS Smart Configurator, consider porting to Windows
NICOS projects

- Atlas Nightly Builds
  - Since autumn 2001
  - 500 packages
  - Several platforms and OS
  - About hundred developers

- POOL nightly builds
  - Since February 2003
Further Information

- ATLAS nightly builds web page

- NICOS web page

- POOL nightly builds web page
  atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/OO/dist/nightlies/poolwww/index.html