



# NICOS System of Nightly Builds for Distributed Development

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# Purpose of NICOS

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- 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

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- 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

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- 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

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- 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

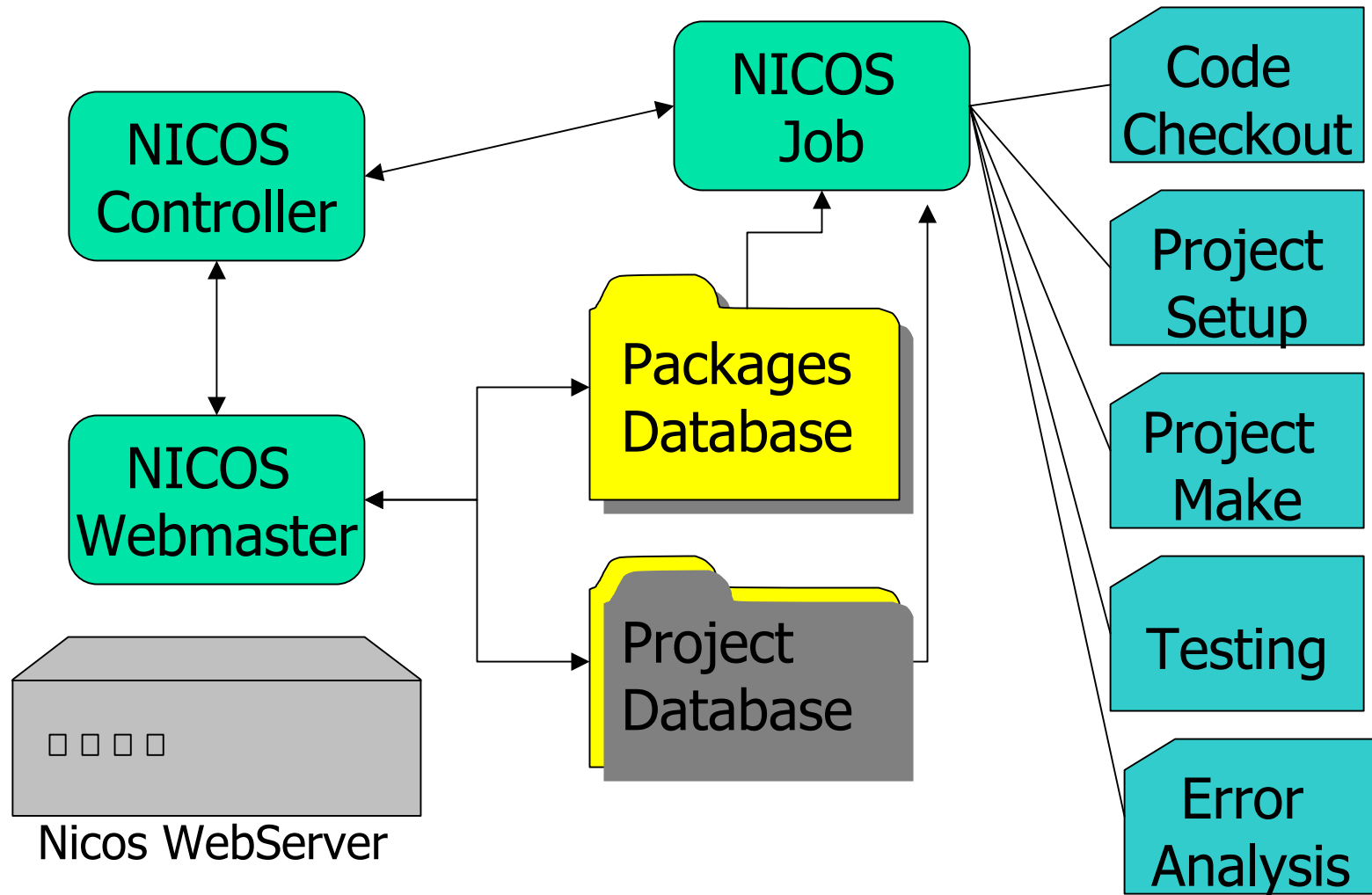


# Stability of builds

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- 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 Organization





# NICOS Project Database

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- 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

```
<project build dir=src>  
scram b  
<error analysis>  
NICOS_MAIL="no"
```





# NICOS Packages Database

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- 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



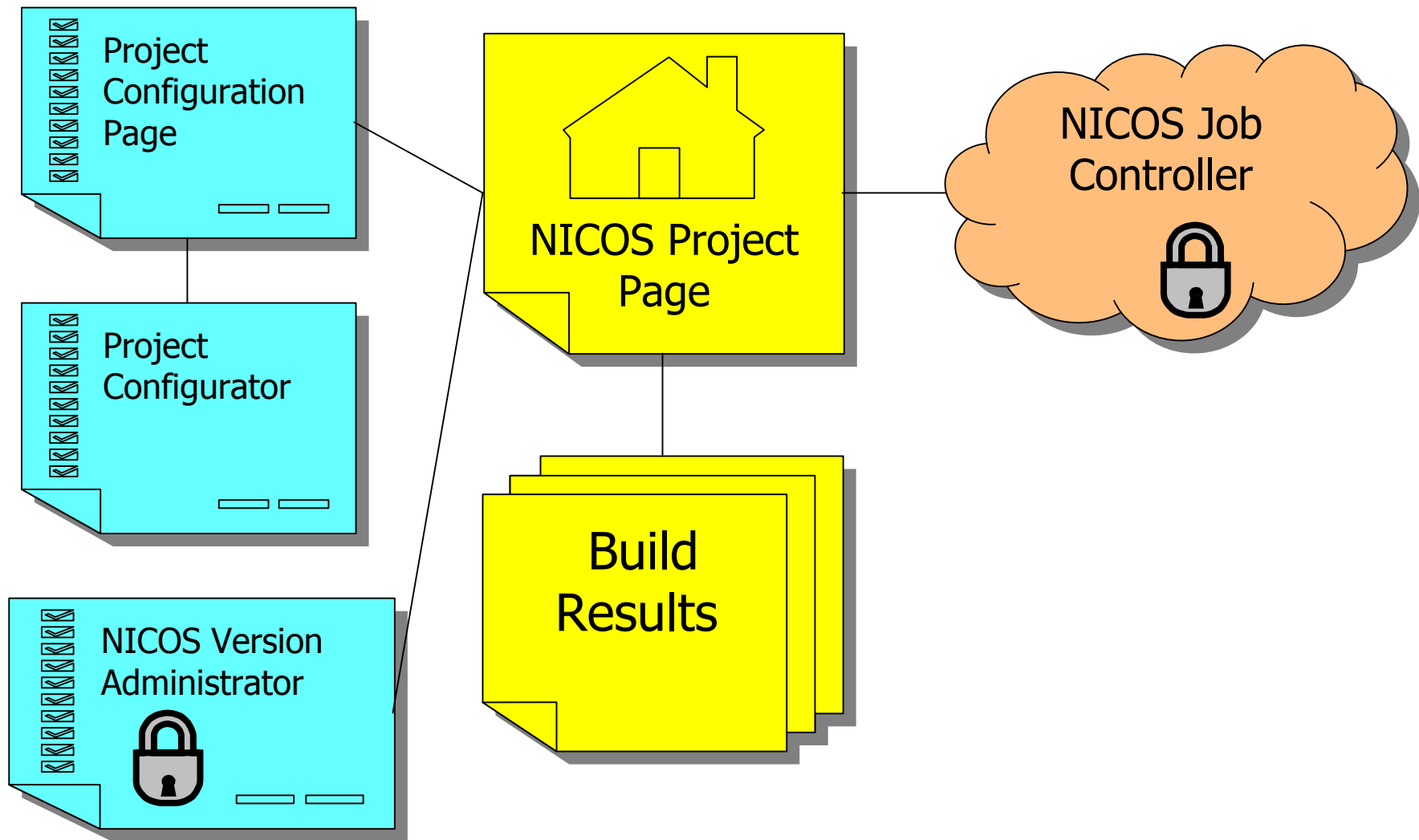
# NICOS Web Server

(available in 0.2 version of NICOS)

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- 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

## NICOS Web Pages



# Example of NICOS Project Web Page

The screenshot shows a Netscape browser window titled "NICOS project page - Netscape". The address bar is empty. The page content includes a header with "NICOS version 0.1-beta" and the title "NICOS (Nightly Control System) project page". Below this, a blue box contains the text "Project: POOL", "Location: /afs/cern.ch/sw/lcg/contrib/releases/POOL", and "Last modified Saturday, March 08, 2003 14:24:52". A table lists seven releases, each with a link to its tags. At the bottom, there is a button labeled "View/Edit Project Configuration".

release name	status	date	list of tags
<a href="#">POOL_RELEASE_0</a>	completed	03/16 01:41	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_1</a>	completed	03/17 01:40	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_2</a>	completed	03/18 01:40	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_3</a>	completed	03/19 01:40	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_4</a>	completed	03/20 01:41	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_5</a>	completed	03/21 01:41	<a href="#">list of tags</a>
<a href="#">POOL_RELEASE_6</a>	completed	03/15 01:41	<a href="#">list of tags</a>

View/Edit Project Configuration

# Example of NICOS Build Results Web Page

The screenshot shows a Netscape browser window titled "nicos webpage with build results - Netscape". The page content is as follows:

**NICOS (Nightly Control 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**

Package name	Container	Build	Test	Manager(s)
<a href="#">Common</a>	N/A	✓	N/A	undrus
<a href="#">FileCatalog</a>	N/A	✗	N/A	nobody
<a href="#">MySQLCatalog</a>	N/A	✗	N/A	nobody

# Example of NICOS Job Controller Page

NICOS job controller - Microsoft Internet Explorer provided by Brookhaven National Lab...

File Edit View Favorites Tools Help

NICOS version 0.2

**NICOS (Nightly Control System): Job Controller**

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

**Platform Linux**

Working on release	Status	Release start	Step start	Action
POOL_RELEASE_1	CODE CHECKOUT	03/16 01:41	02:03	Kill all processes Restart (full) Redo current step

**Platform SunOS**

Working on release	Status	Release start	Step start	Action
POOL_RELEASE_0	COMPLETED	03/15 03:40	-	Start immediately Do not build today

Done Local intranet

# Example of NICOS Version Administrator Page

The screenshot shows a web browser window titled "NICOS version administrator page - Microsoft Internet Explorer provided b...". The browser's address bar is empty, and the menu bar includes File, Edit, View, Favorites, Tools, and Help. The page content is as follows:

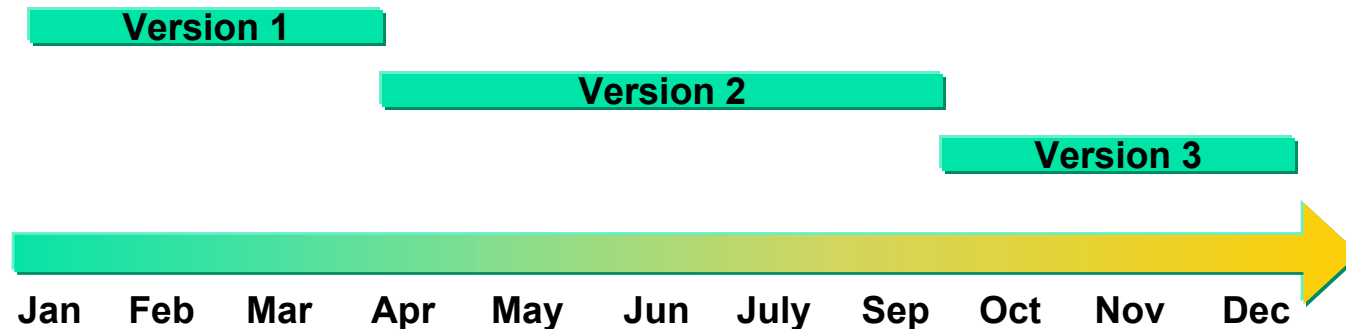
- A light blue header bar at the top right contains the text "NICOS version 0.2" in red.
- Below the header, a light blue box contains the text "NICOS (Nighly Control System): Version Administartor" in red, italicized font.
- Below that, a light blue box contains the text "Project: POOL" and "Location: /afs/usatlas.bnl.gov/project/nightly/POOL" in red.
- A yellow box in the center contains the text "Current versions" in blue.
- Below the yellow box is a table with four columns: Package, Version, Author, and Actions.
- The table has one row with the following data: Package: DataSvc (with a dropdown arrow), Version: DataSvc-01-00-02, Author: clever@univer.edu, and Actions: Edit (in a blue box) and Delete (in a red box).
- Below the table is a yellow box containing the text "Add new package" in blue.
- The browser's status bar at the bottom shows "Done" on the left and "Local intranet" on the right.



# Schedule

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## Three phases of NICOS development



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





# NICOS projects

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- Atlas Nightly Builds
  - Since autumn 2001
  - 500 packages
  - Several platforms and OS
  - About hundred developers
- POOL nightly builds
  - Since February 2003



# Further Information

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- ATLAS nightly builds web page  
[atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/00/dist/nightlies/www/nightly\\_builds.html](http://atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/00/dist/nightlies/www/nightly_builds.html)
- NICOS web page  
[www.usatlas.bnl.gov/computing/software/nicos/index.html](http://www.usatlas.bnl.gov/computing/software/nicos/index.html)
- POOL nightly builds web page  
[atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/00/dist/nightlies/poolwww/index.html](http://atlas.web.cern.ch/Atlas/GROUPS/SOFTWARE/00/dist/nightlies/poolwww/index.html)