The Sisyphus Continuous Integration & Release System

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Introduction

- Me: Tijs van der Storm
- Phd in november 2007
- Post-doc (CWI) / teacher (UvA)
- Today: Sisyphus
Roadmap

- Introducing Sisyphus
- Incremental integration
- Backtracking integration
- Implementation
- Conclusion
Background

- ASF+SDF Meta-Environment
- Around 70 components (currently)
- Release was a manual, painful process
  - syncing dependencies and versions
- Daily build too coarse-grained
  - build problems hard to fix
- => Sisyphus
Continuous release

- From CI to *continuous release*
  - every successful build is released
  - bill of materials (BOM) accurately tracked
  - opportunity for *continuous updates*

- Similar to Nix, only:
  - less focus on deployment
  - more focus on release
  - simpler
Sisyphus’ features

- Component-based
  - to allow CBSE/reuse/variation
- Incremental
  - to prevent redundant builds
- Backtracking
  - to mitigate the ripple effect of failure
- Bills of materials
  - to allow automatic release
Incremental integration

- Determine affected components
  - components with changes
  - their co-dependencies
- Build & test in topological order
  - when *A requires B*
  - build *B* before *A*
- Reuse earlier builds of unaffected components
Incremental Integration
Build sharing (since 12-2005)

![Graph showing build sharing]
Failing builds

Legend:
- **Successful**
- **Failed**
- **Not tried**
Backtracking

- Build failure ripple effect
  - lower components that fail prevent all higher components to be built
  - yet the higher components might have changes that require integration

- “A build is better than no build”
  - feedback
  - release opportunity

=> backtracking
Backtracking in Sisyphus

- Persistently store all built artifacts
- If a dependency build has failed
  - search for suitable *older* builds
  - build against those dependencies
- Two types of backtracking:
  - simple (currently in use)
  - true (prototype)
Simple backtracking
True backtracking
No backtracking (32 weeks)
Simple backtracking (32 weeks)
Implementation overview

- Builders (one per host)
- Database (bills of materials)
- Configuration repository
  - settings per builder
  - specification of component locations
  - specification of build steps and templates
- Web application (front-end)
Deployment architecture

Sisyphus builder
Ruby

Source repository
Subversion

Database
PostgreSQL

File server
NFS

Config repository
Subversion

Webserver
Apache

Web of Sisyphus
Ruby on Rails
Dynamics
BOM Model

**Component**
- name : string

**Platform**
- kernel_name : string
- kernel_release : string
- hardware_platform : string
- hardware_class : string
- processor_type : string

**Profile**
- name : string
- version : integer

**Host**
- uname : string
- status : text
- progress : text
- active : boolean
- busy : boolean
- dists : boolean
- sources_version : integer
- script_version : integer

**Revision**
- version : integer
- changelog_diff : text
- informative_version : string

**Session**
- time : datetime

**Item**
- progress : boolean
- success : boolean
- released : boolean

**Result**
- command : text
- output : text
- success : boolean
- environment : text
- error_output : text
- action : text
Web of Sisyphus

- Results are published on the web
  - Real-time builder status
  - Full logs of builds

- Bill of materials
  - Dependency information
  - Builder settings

- Release information
  - Source & binary distributions
<table>
<thead>
<tr>
<th>Menu</th>
<th>Status</th>
<th>Configuration</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>Builds</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Sessions</td>
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<td>Logs</td>
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### Status

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<th>Result</th>
<th>Date</th>
<th>Time</th>
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</thead>
<tbody>
<tr>
<td>JJTraveler</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>JReICal</td>
<td>success</td>
<td>16:16 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>apigen</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>asc-support</td>
<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>ast</td>
<td>not tried</td>
<td>09:24 12/06</td>
<td>12/06</td>
</tr>
<tr>
<td>asf</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>asf-library</td>
<td>success</td>
<td>09:24 12/06</td>
<td>12/06</td>
</tr>
<tr>
<td>asf-support</td>
<td>not tried</td>
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<td>osfclf-meta</td>
<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>xterm</td>
<td>failed</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>xterm-java</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>balanced-binary-atoms</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<td>c-library</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>config-manager</td>
<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>config-support</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>console-grepber</td>
<td>failed</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>console-gui</td>
<td>failed</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<td>dialog-gui</td>
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<td>12/06</td>
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<td>editor-manager</td>
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<td>error-gui</td>
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<td>16:56 11/06</td>
<td>12/06</td>
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<td>16:56 11/06</td>
<td>12/06</td>
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<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
<tr>
<td>io-support</td>
<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>meta</td>
<td>not tried</td>
<td>16:56 11/06</td>
<td>12/06</td>
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<tr>
<td>meta-autotools</td>
<td>success</td>
<td>16:56 11/06</td>
<td>12/06</td>
</tr>
</tbody>
</table>

### Comments

- Comments and constructive criticisms are welcome via email.
Web of Sisyphus

Build information

Component: asfsdf-meta
Revision: 22939
Result: success
Session: 09:20 12/06/2007 (messages)
Host: joustra.sen.cwi.nl
Profile: joustra version 254
Sources version: 262
Script version: 253
Earlier builds: 36739, 36721, 36648, 36580, 36530, 36519, 36505, 36491, 36479, 36465
Distribution: asfsdf-meta-2.0.1RC2pre.22939.36783.tar.gz
Bundle: asfsdf-meta-bundle-2.0.1RC2pre.22939.36783.tar.gz
Binary: asfsdf-meta-2.0.1RC2pre.22939.36783.bin.sh

Actions

reconf: success
configure: success
make: success
install: success
check: success
doc: success
distcheck: success
pathcheck: success
overlapcheck: success
bindist: success

Recent builds

- asf-library: success
  apps.cwi.nl at 09:24 12/06

- asfsdf-meta: success
  joustra.sen.cwi.nl at 09:20 12/06

- sdf-meta: success
  joustra.sen.cwi.nl at 09:20 12/06

- asf: failed
  joustra.sen.cwi.nl at 09:20 12/06

- meta-doc: failed
  apps.cwi.nl at 16:56 11/06

- sdf-apigen: success
  apps.cwi.nl at 16:56 11/06

- apigen: success
  apps.cwi.nl at 16:56 11/06
Build information

Component: asf
Revision: 22994
Result: failed
Session: 09:20 12/06/2002 (messages)
Host: joustra.sen.cwi.nl
Profile: joustra version 254
Sources version: 262
Script version: 252
Earlier builds: 36735 36663 36564 36523 36510 36494 36482 36470 36461 36458

Actions

reconf: success
configure: success
make: success
install: success
check: failed

Dependencies

- Dependency graph
- Reduced dependency graph

Component Revision Status Session
meta-autotools 20184 success 15:17 30/05/2007 Details
meta-build-env 22977 success 16:16 11/06/2007 Details
atecm 22965 success 16:16 11/06/2007 Details
toolbusib 22985 success 16:16 11/06/2007 Details
error-support 22991 success 16:16 11/06/2007 Details
pt-support 22881 success 16:16 11/06/2007 Details
asf-support 22874 success 16:16 11/06/2007 Details
ptable-support 22903 success 16:16 11/06/2007 Details
tide-support 22713 success 16:16 11/06/2007 Details
vcs-support 22857 success 16:16 11/06/2007 Details
Conclusion

- Sisyphus
  - continuous integration
  - continuous release

- Key features:
  - incremental integration
  - backtracking integration

- More info:
  - Backtracking Incremental Continuous Integration (to appear, CSMR’08)
Directions for further research

- Support for multiple branch configurations
- Decentralized integration
  - multiple repositories
  - multiple integration sites
Thank you

Questions?

Sisyphus
Overview of Sisyphus
Continuous Integration (CI)

- Best practice (?)
  - frequent committing of changes
  - after commit, do a clean build
  - then run all tests

- Heartbeat of software development
  - If the build breaks, fixing it is top priority

- Anti-practice: *big bang integration*
Why continuous integration?

- It’s all about feedback
  - *global* effects of *local* changes
- Early discovery of problems
  - minimize interaction between changes
  - prevent *integration hell*
- Centralized source of knowledge
- Always a working version