Agile Software Production?

Andrew Patterson

Electric Cloud Europe

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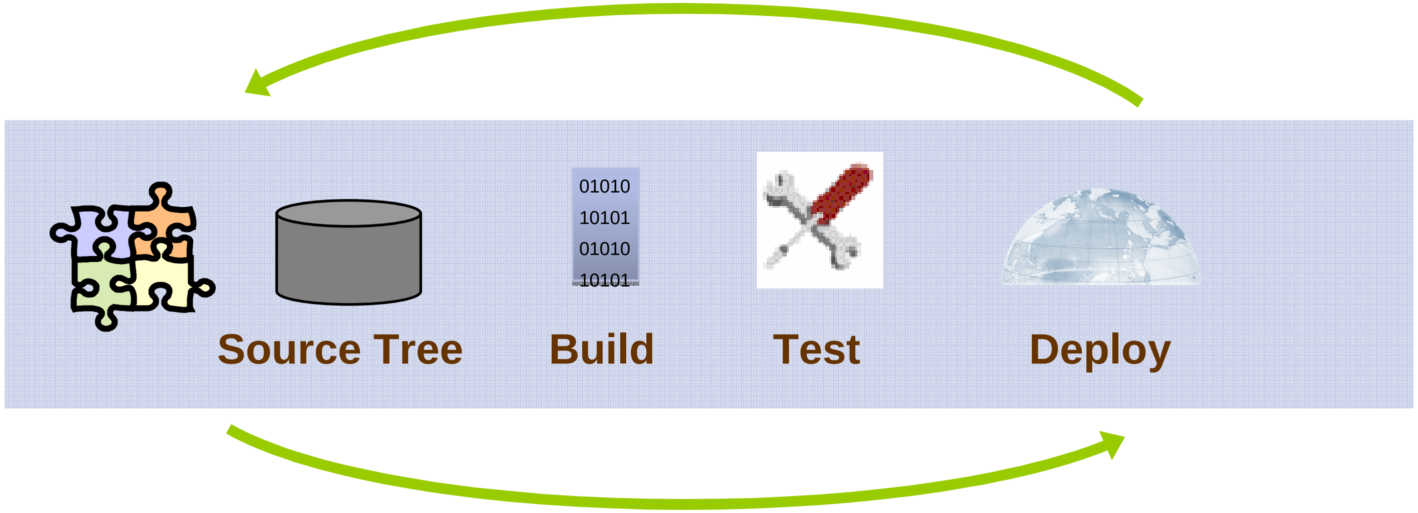
www.electric-cloud.com

Agenda

- Its not (just) about Agile Development
- The real issues in the Software Development Lifecycle
  - What are they?
  - What is important?
- Software Production : Tool Options
  - Buy or Build?
  - How do you decide?

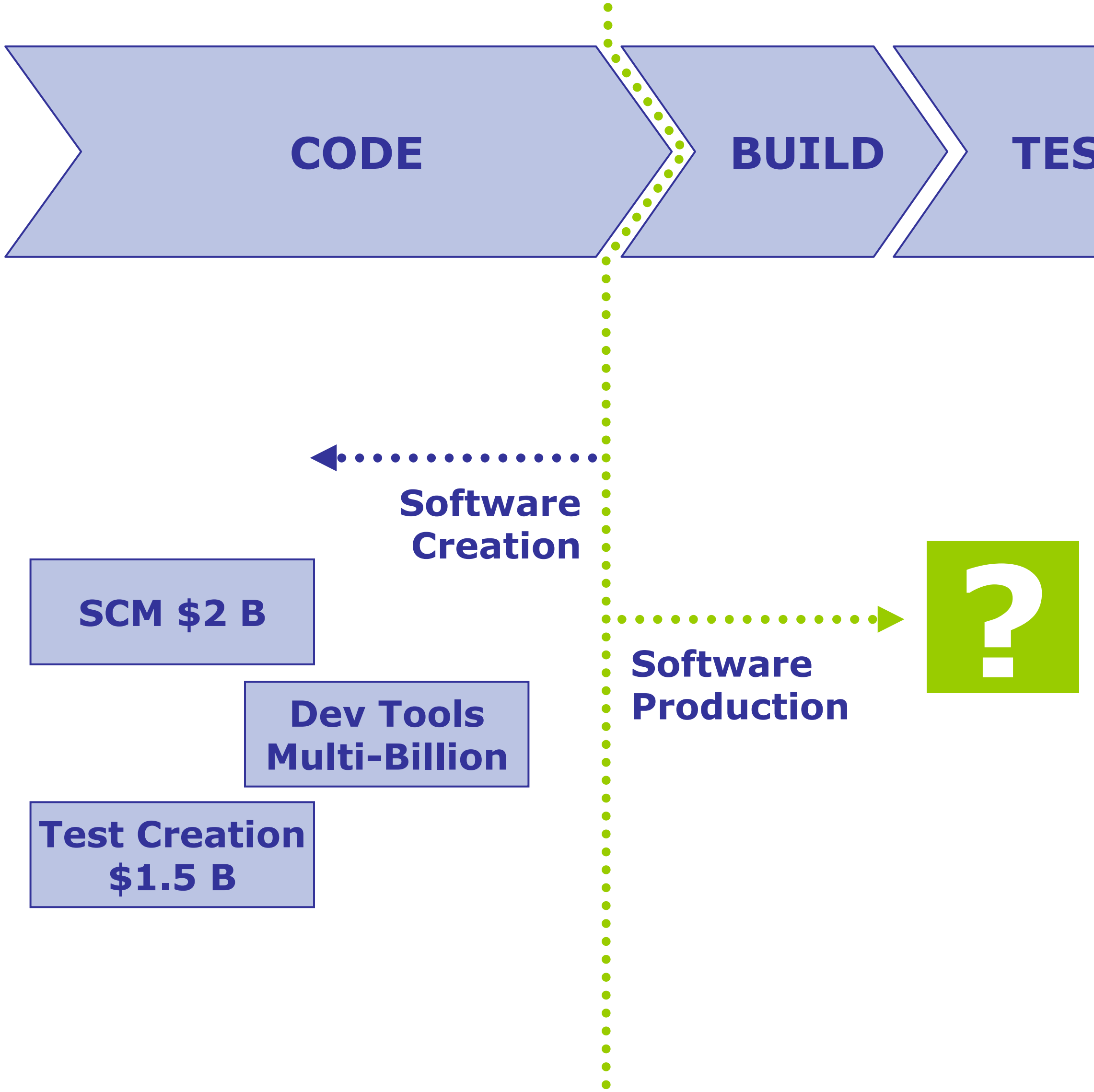
The Ideal?



Agile Build, Test and Deployment

High Degree of Automation

LifeCycle Tool Investment



CODE

BUILD

TEST

DEPLOY

Software Creation

SCM $2 B

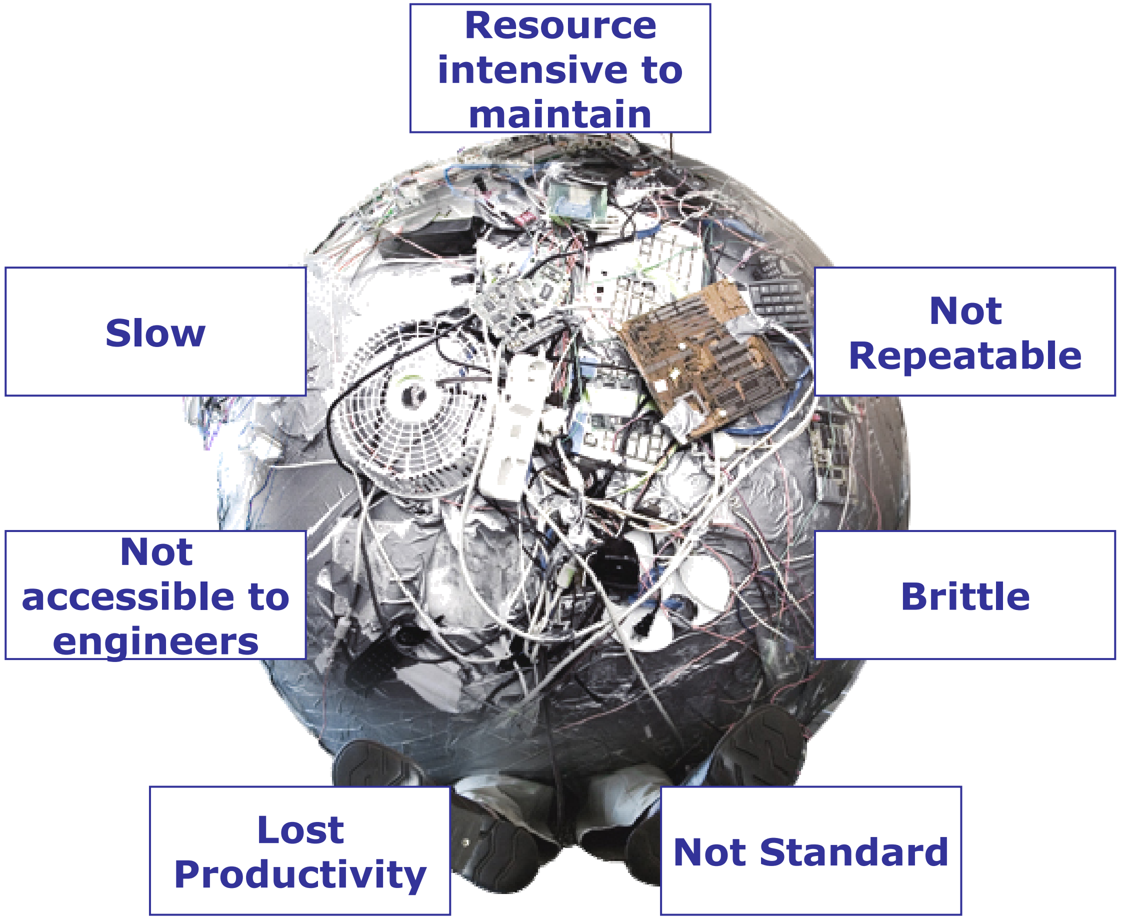
Dev Tools Multi-Billion

Test Creation $1.5 B

Software Production

?

SPM Problems



- Slower time to market
- Lower quality
- Lack of compliance
- Roadblock to modern development techniques
  - Agile
  - Global teams
  - Virtual environments

Software Production Checklist

Topic	Response	Comment
Build times > 30 minutes		**Multiplies up with variants, localisation**
Slow, manual steps from SCM->Build->Test		**Time consuming**
Need *Continuous Integration*		**Help with time-to-market, code quality**
Have problems managing and maintaining build scripts / single person has knowledge		**High-risk**
Need to build on multiple platforms		**Can be a serial, slow process**
Developers lose time waiting for overnight builds, test results		**Developers switch projects while waiting**
Project releases would be earlier if multiple platform build and test run in parallel		**Don’t know what can be parallelised**
Need visibility/metrics on build and test progress		**Manual work today**
Have distributed teams sharing common build and test processes		**Increasingly common**

Production Time Example

- 1 SmartPhone
  - Ground-Up Build time 37 hours
- 4 Hardware Platforms
- 22 Localisation builds for target languages
- 135 days total…

- Incremental builds and links can lead to dependency issues
- One file change / bug fix and start-over

Project Trade-off.

- You may only have three of these :

Good	(Quality)
Fast	(Time to Market)
Cheap	(Cost Effective)
Done	(Project Completed)

- But, You can optimise the mix

What is the Enterprise Requirement?

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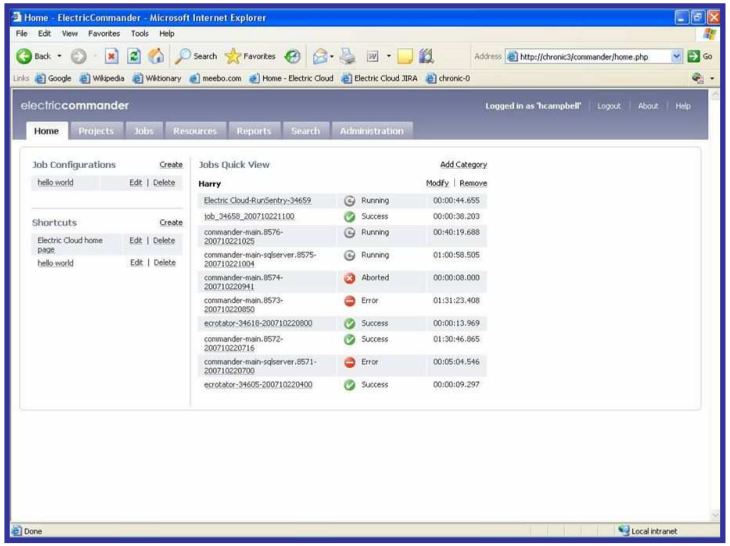
Linking Distributed Teams

SW DEVELOPERS
Copenhagen

ENGINEERING MGR
Boston

BUILD TEAM
San Francisco


Home - ElectricCommander - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back
Search
Favorites
Address http://chronic3/commander/home.php
Go
Links Google Wikipedia Wiktionary meebo.com Home - Electric Cloud Electric Cloud JIRA chronic-0
electriccommander
Logged in as 'hcampbell'
Logout
About
Help
Home
Projects
Jobs
Resources
Reports
Search
Administration
Done
Local intranet

Job Configurations Create

hello world	Edit | Delete

Shortcuts Create

Electric Cloud home page	Edit | Delete
hello world	Edit | Delete

Jobs Quick View Add Category

Harry Modify | Remove

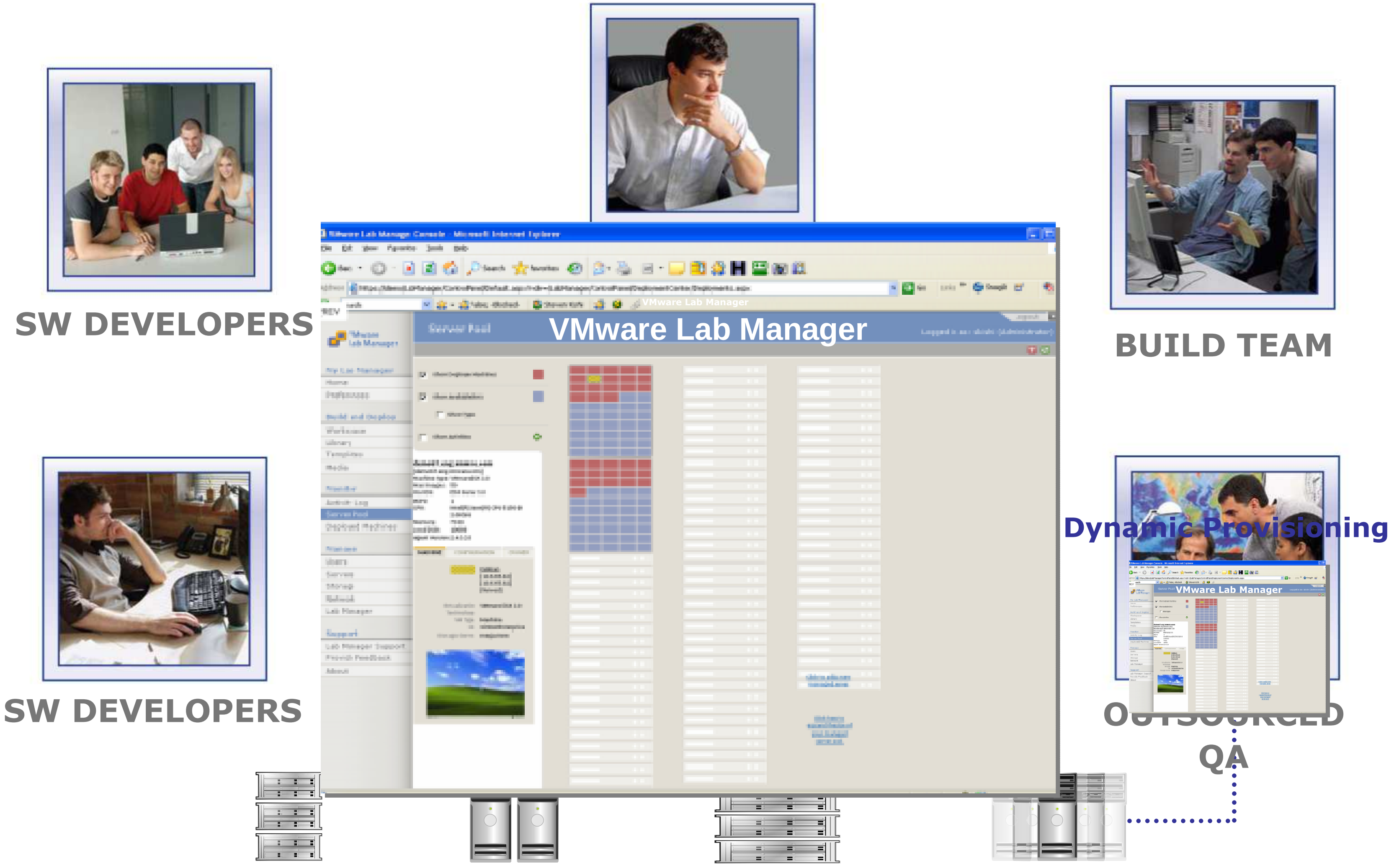
Electric Cloud-RunSentry-34659	Running	00:00:44.655
job_34658_200710221100	✓ Success	00:00:38.203
commander-main.8576-200710221025	Running	00:40:19.688
commander-main-sqlserver.8575-200710221004	Running	01:00:58.505
commander-main.8574-200710220941	☒ Aborted	00:00:08.000
commander-main.8573-200710220850	Error	01:31:23.408
ecrotator-34618-200710220800	✓ Success	00:00:13.969
commander-main.8572-200710220716	✓ Success	01:30:46.865
commander-main-sqlserver.8571-200710220700	Error	00:05:04.546
ecrotator-34605-200710220400	✓ Success	00:00:09.297

SW DEVELOPERS
Bulgaria

OUTSOURCED QA
Bangalore

Specific Access and Permissions Based on Role Anywhere in the World

Managing Resources



SW DEVELOPERS

BUILD TEAM

VMware Lab Manager

Dynamic Provisioning

SW DEVELOPERS

OUTSOURCED QA

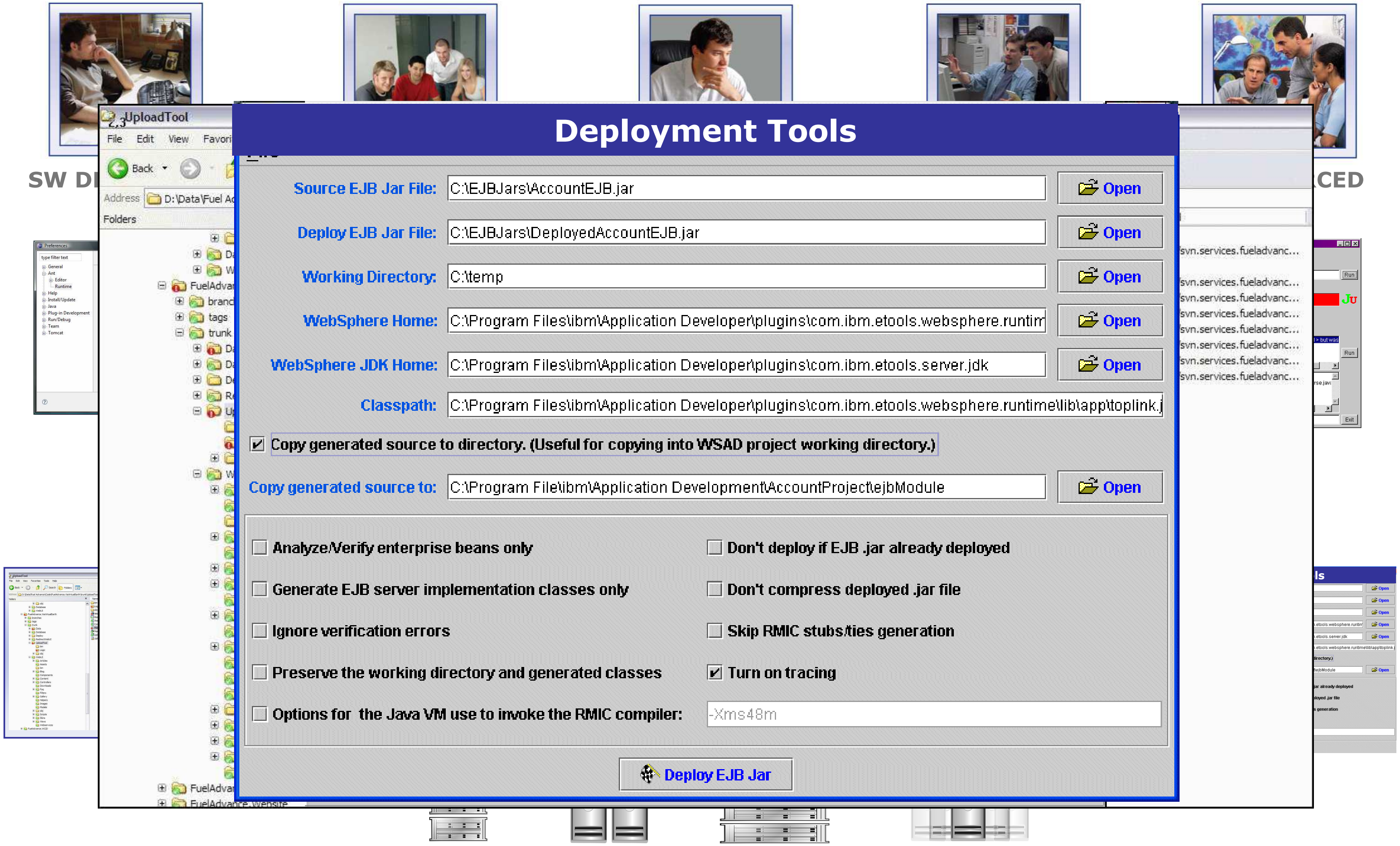
Build Servers

Test Servers

Production Servers

Virtual Servers

Integrate Tools and Processes



Deployment Tools

Source EJB Jar File: C:\EJBJars\AccountEJB.jar [Open]

Deploy EJB Jar File: C:\EJBJars\DeployedAccountEJB.jar [Open]

Working Directory: C:\temp [Open]

WebSphere Home: C:\Program Files\ibm\Application Developer\plugins\com.ibm.etools.websphere.runtim [Open]

WebSphere JDK Home: C:\Program Files\ibm\Application Developer\plugins\com.ibm.etools.server.jdk [Open]

Classpath: C:\Program Files\ibm\Application Developer\plugins\com.ibm.etools.websphere.runtime\lib\app\toplink.j

☑ Copy generated source to directory. (Useful for copying into WSAD project working directory.)

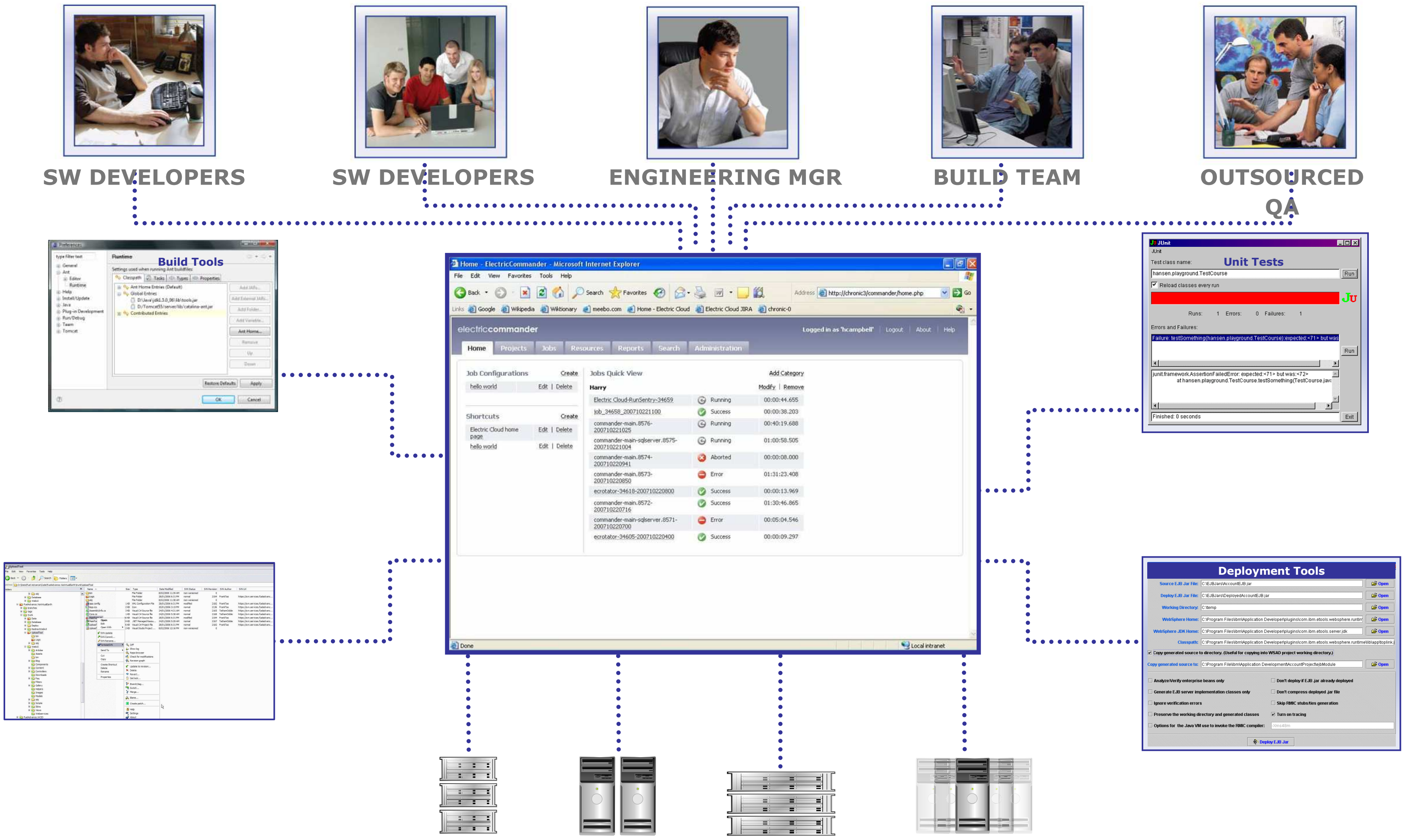
Copy generated source to: C:\Program File\ibm\Application Development\AccountProject\ejbModule [Open]

- □ Analyze/Verify enterprise beans only
- □ Generate EJB server implementation classes only
- □ Ignore verification errors
- □ Preserve the working directory and generated classes
- □ Options for the Java VM use to invoke the RMIC compiler: -Xms48m
- □ Don't deploy if EJB .jar already deployed
- □ Don't compress deployed .jar file
- □ Skip RMIC stubs/ties generation
- ☑ Turn on tracing

[Deploy EJB Jar]

Build Servers Test Servers Production Servers Virtual Servers

Tie it all Together



SW DEVELOPERS

SW DEVELOPERS

ENGINEERING MGR

BUILD TEAM

OUTSOURCED QA

Build Tools

Unit Tests

Deployment Tools

Home - ElectricCommander - Microsoft Internet Explorer

Address http://chronic3/commander/home.php

electriccommander — Logged in as 'hcampbell' | Logout | About | Help

Home | Projects | Jobs | Resources | Reports | Search | Administration

Job Configurations — Create

hello world — Edit | Delete

Shortcuts — Create

Electric Cloud home page — Edit | Delete

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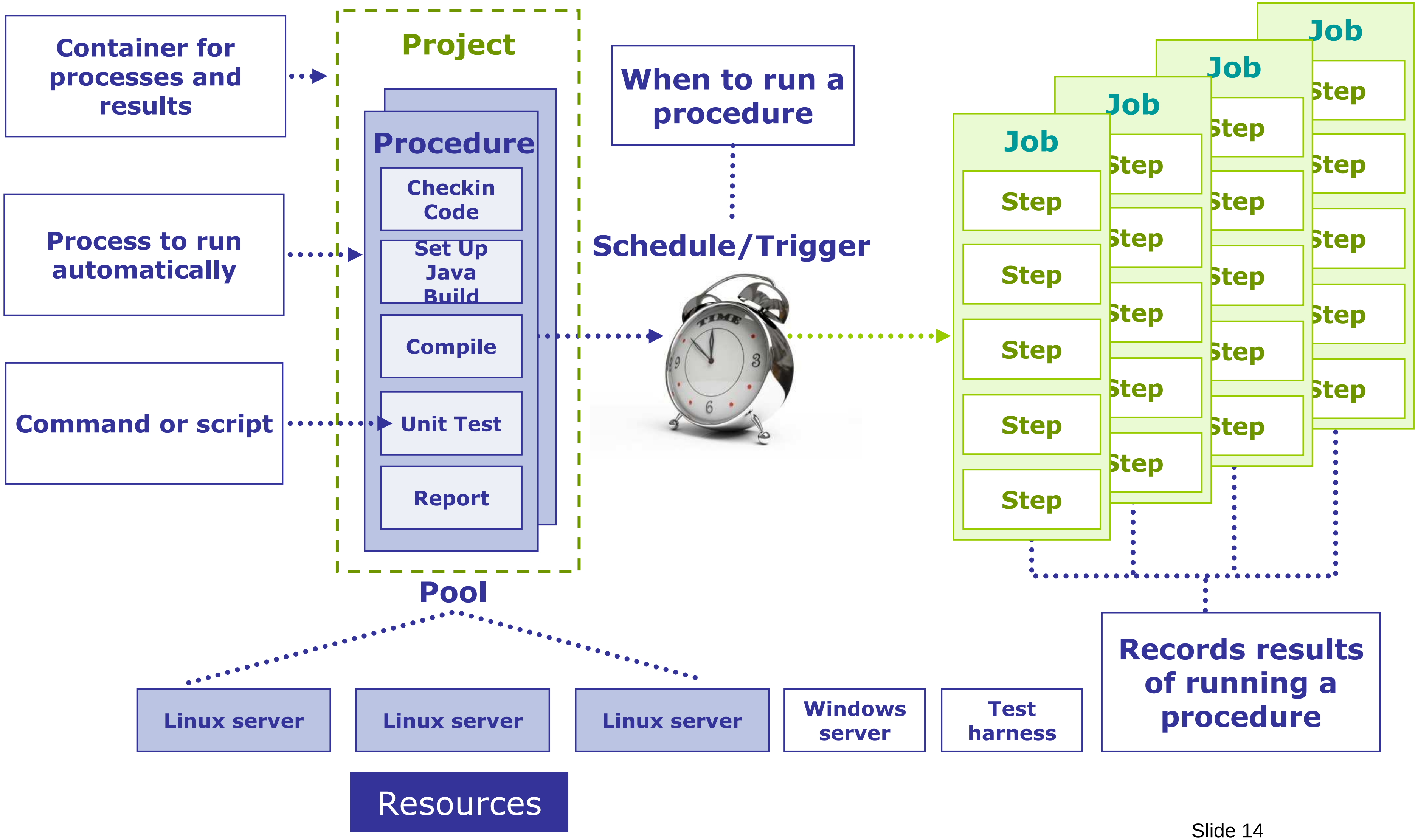
Build Servers

Test Servers

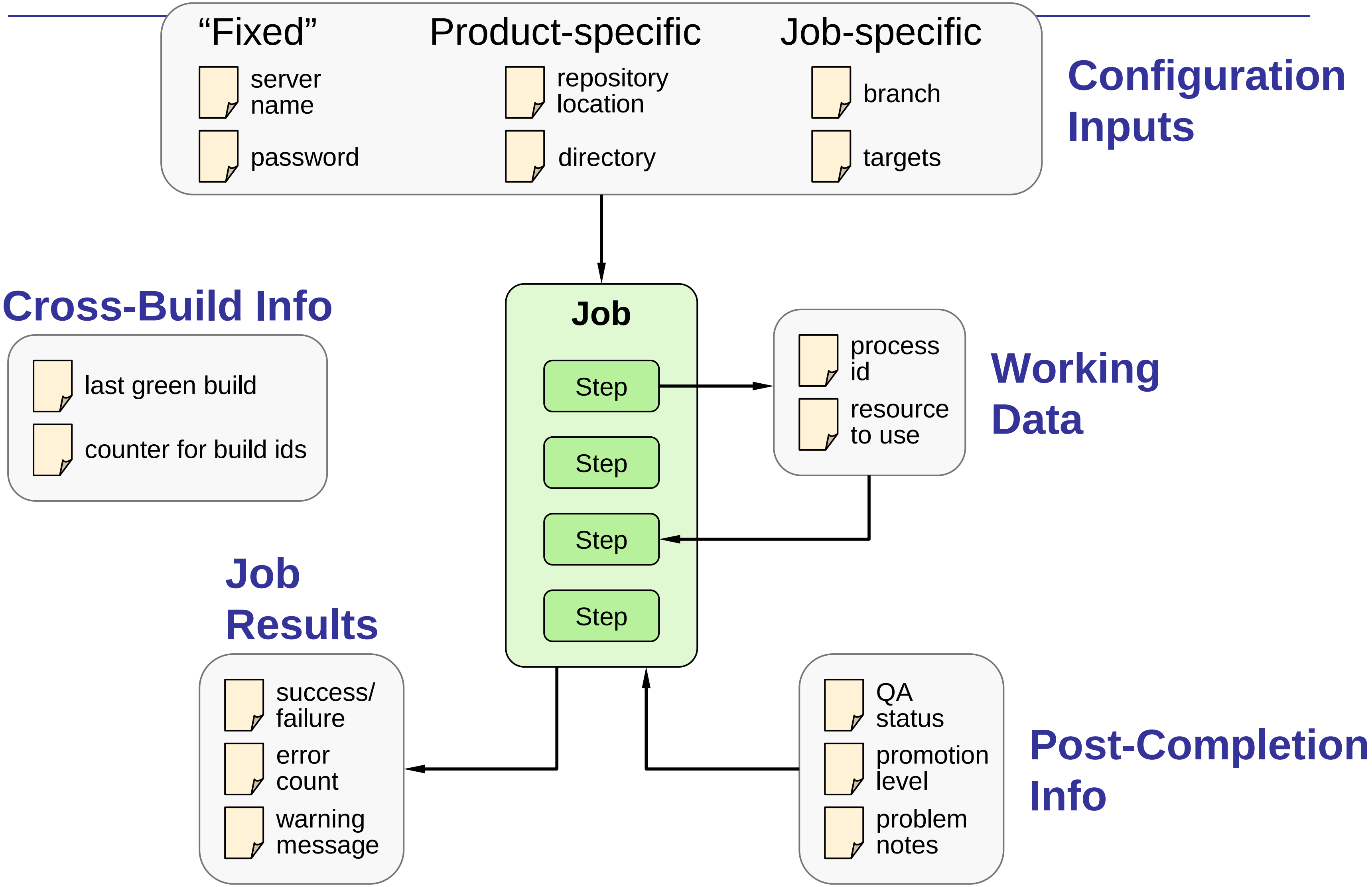
Production Servers

Virtual Servers

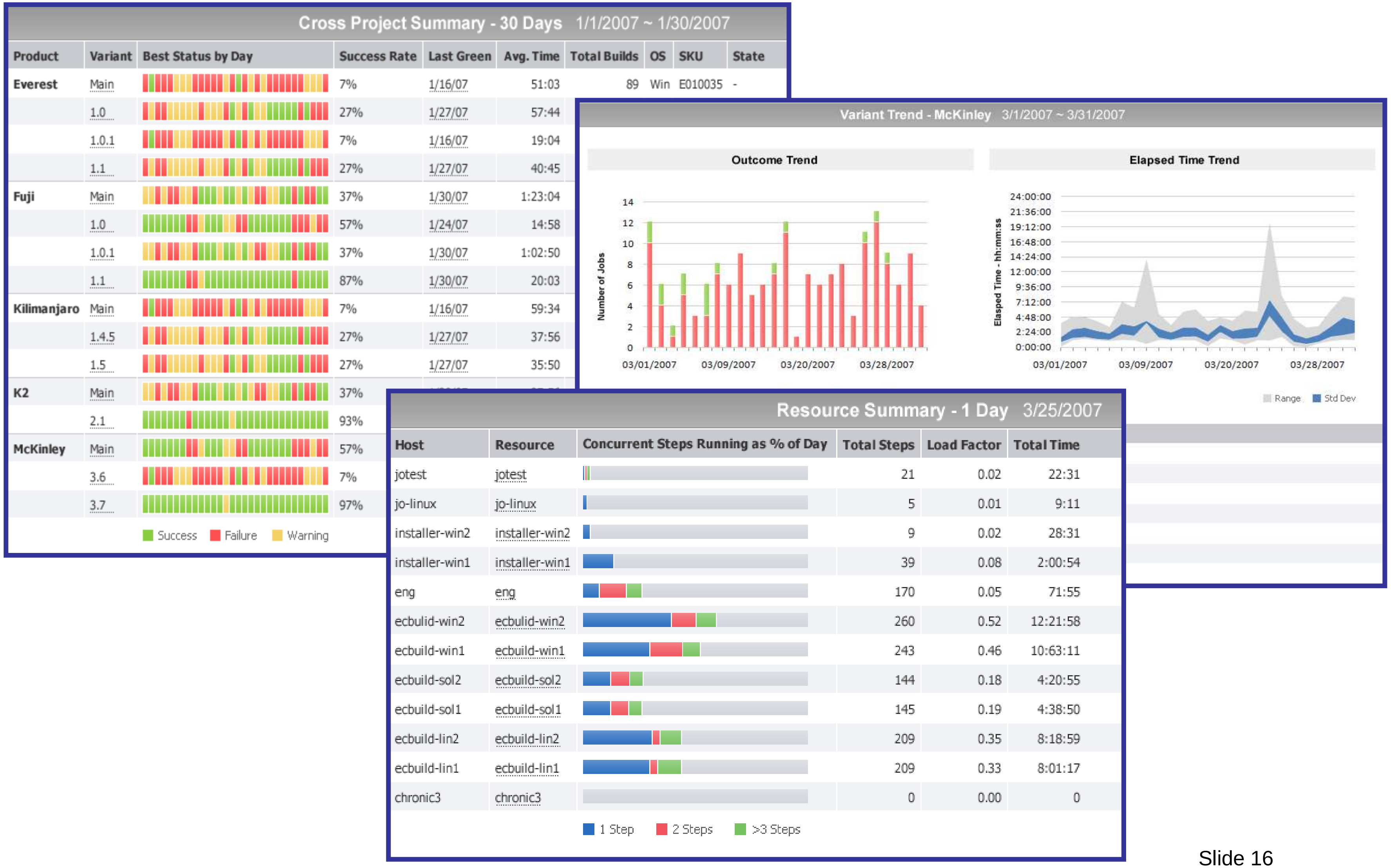
Blue Sky Solution



Managing Build and Test Data



Visibility: Management Reports



Cross Project Summary - 30 Days 1/1/2007 ~ 1/30/2007

Product	Variant	Best Status by Day	Success Rate	Last Green	Avg. Time	Total Builds	OS	SKU	State
Everest	Main		7%	1/16/07	51:03	89	Win	E010035	-
	1.0		27%	1/27/07	57:44				
	1.0.1		7%	1/16/07	19:04				
	1.1		27%	1/27/07	40:45				
Fuji	Main		37%	1/30/07	1:23:04				
	1.0		57%	1/24/07	14:58				
	1.0.1		37%	1/30/07	1:02:50				
	1.1		87%	1/30/07	20:03				
Kilimanjaro	Main		7%	1/16/07	59:34				
	1.4.5		27%	1/27/07	37:56				
	1.5		27%	1/27/07	35:50				
K2	Main		37%						
	2.1		93%						
McKinley	Main		57%						
	3.6		7%						
	3.7		97%						

🟩 Success 🟥 Failure 🟨 Warning

Variant Trend - McKinley 3/1/2007 ~ 3/31/2007

Resource Summary - 1 Day 3/25/2007

Host	Resource	Concurrent Steps Running as % of Day	Total Steps	Load Factor	Total Time
jotest	jotest		21	0.02	22:31
jo-linux	jo-linux		5	0.01	9:11
installer-win2	installer-win2		9	0.02	28:31
installer-win1	installer-win1		39	0.08	2:00:54
eng	eng		170	0.05	71:55
ecbulid-win2	ecbulid-win2		260	0.52	12:21:58
ecbuild-win1	ecbuild-win1		243	0.46	10:63:11
ecbuild-sol2	ecbuild-sol2		144	0.18	4:20:55
ecbuild-sol1	ecbuild-sol1		145	0.19	4:38:50
ecbuild-lin2	ecbuild-lin2		209	0.35	8:18:59
ecbuild-lin1	ecbuild-lin1		209	0.33	8:01:17
chronic3	chronic3		0	0.00	0

🟦 1 Step 🟥 2 Steps 🟩 >3 Steps

Methodology : Continuous Integration and Pre-Flight Builds

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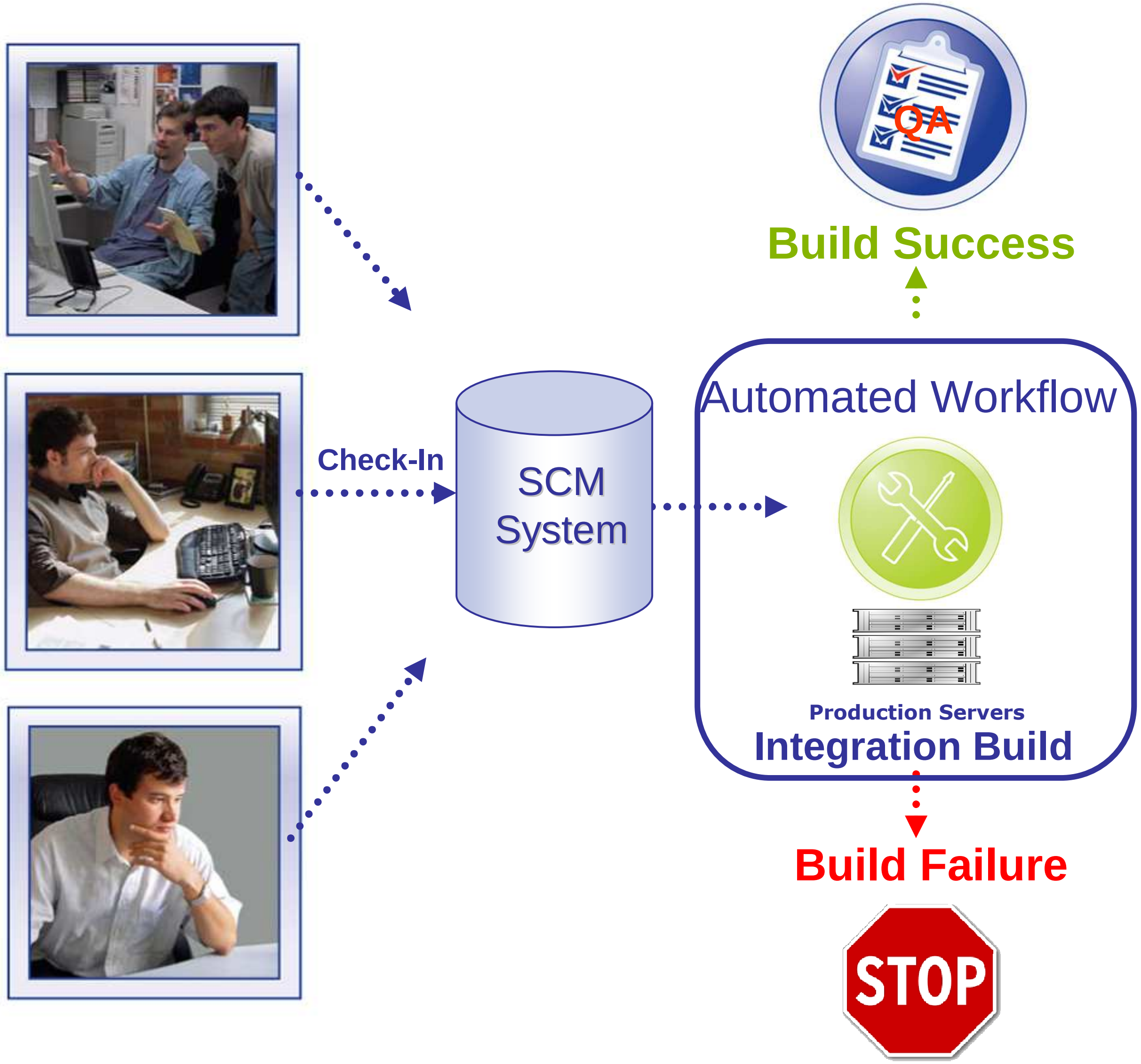
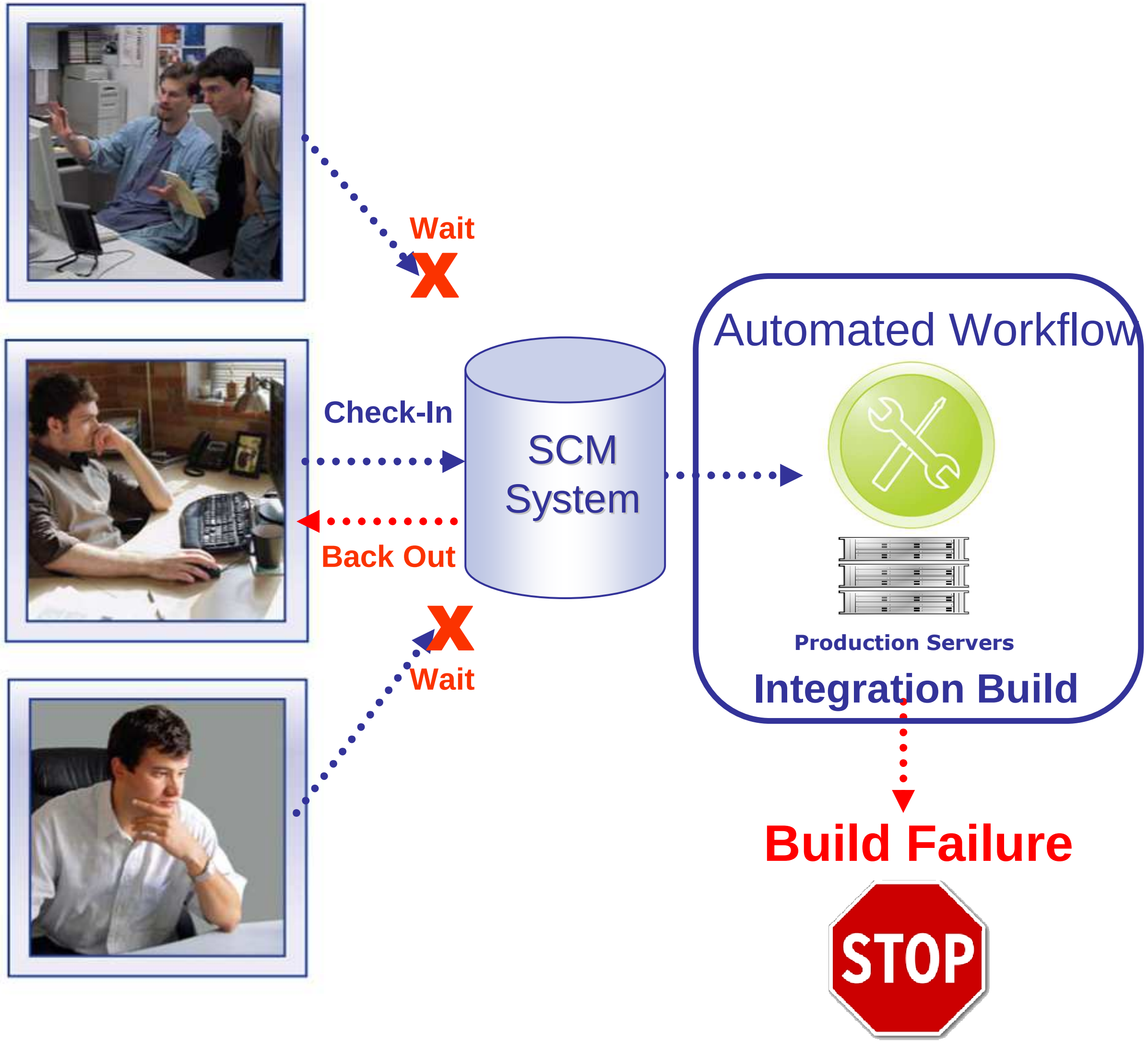
Continuous Integration



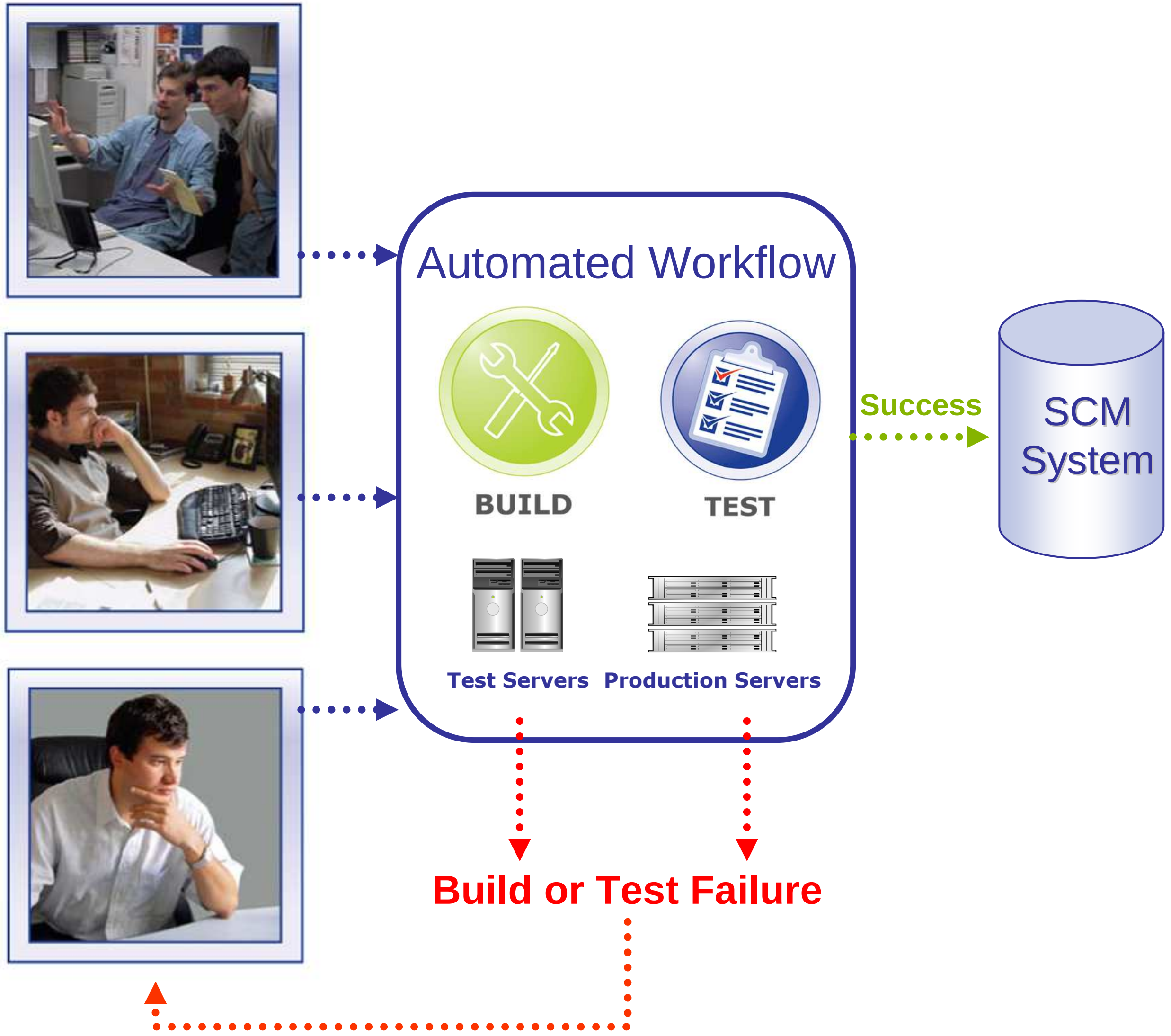
- Developer runs local build and unit tests
- Developer checks tested code into SCM system
- Integration build at frequent intervals or upon check-in

Frequent Problem: Continuously Broken Builds



- Developer builds/tests on local system, checks in code
- Integration build started, breaks ("it worked on my machine")
- Team impacted while check-in is backed out or build fixed

Solution: Pre-Flight Builds and Tests



Automated Workflow

BUILD

TEST

Test Servers

Production Servers

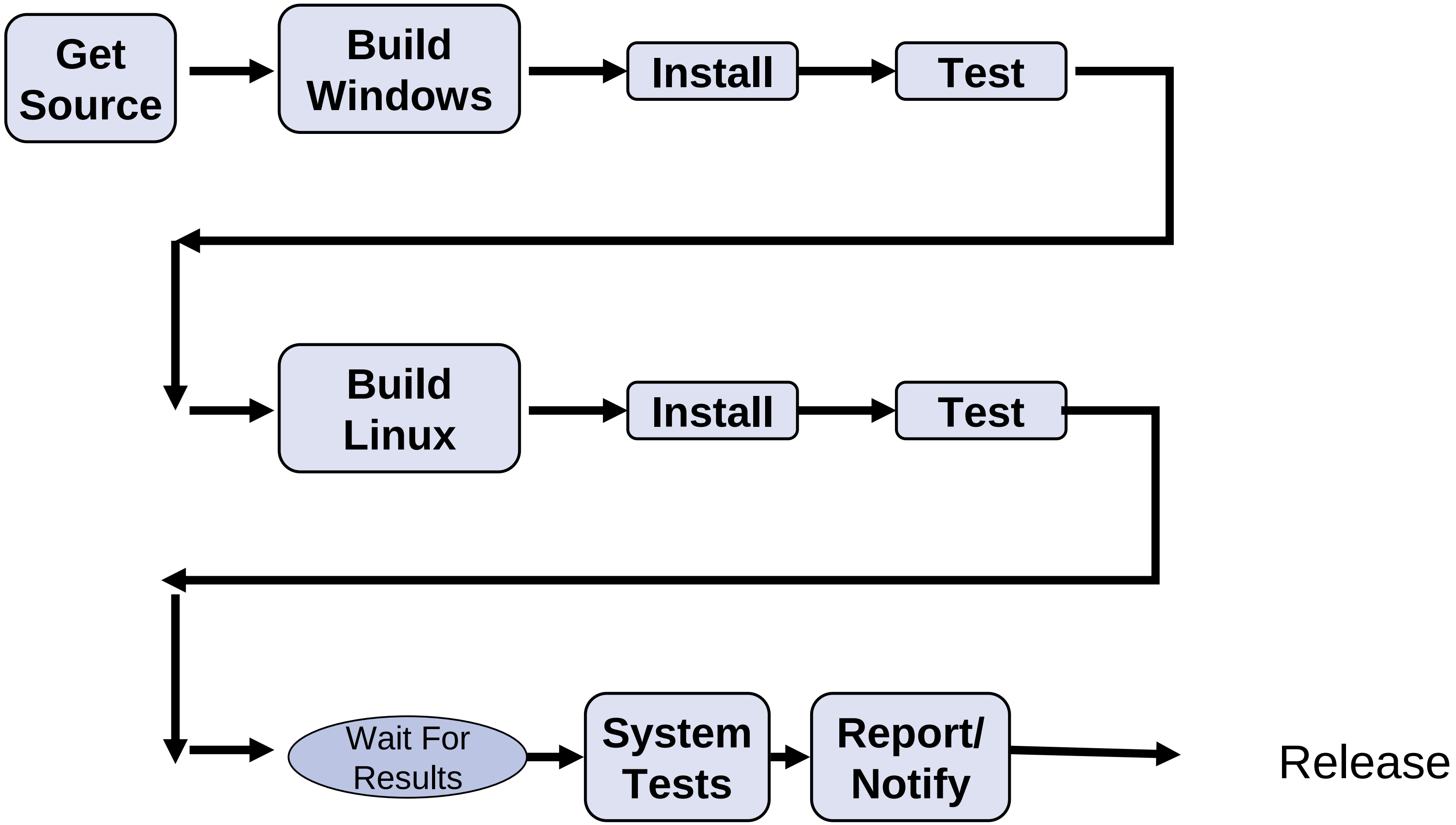
Success

SCM System

Build or Test Failure

- Developers build and test *across all targets/platforms*
- Ensures successful integration build
- Developers can check in changes with confidence
- Broken builds less likely to affect the entire team

What Actually Happens



The MVP

- **Who are the engineering team MVPs?**
  - Managers?
  - Developers?
  - QA?
- **The MVP is the build manager supporting the script**
- **Why?**

Who Else?

- The build manager actually *builds* the product that’s *shipped*
- Sure, developers write the features and bugs
- Sure, QA tests that the product works
- Sure, managers do something valuable
- But the build manager…
  - … that guy actually built the thing your company ships
  - … that guy probably stayed up until 3am to make it happen
- So why does that guy get no decent tools?

The Rise and Rise of the MVP Build Manager

- **In the old days..**
  - TBM didn't exist, being TBM was a role taken on by a developer
  - Developers hated to be the 'build guy' for the day
- **The software grew; the build grew**
  - TBM role is formalized, but developers still looked down on him
- **Today**
  - The Manager invites TBM to join his weekly staff meeting; TBM matters now
  - Developers, QA and Management harass him about broken builds

Quick Win : Accelerating the Software Production Process

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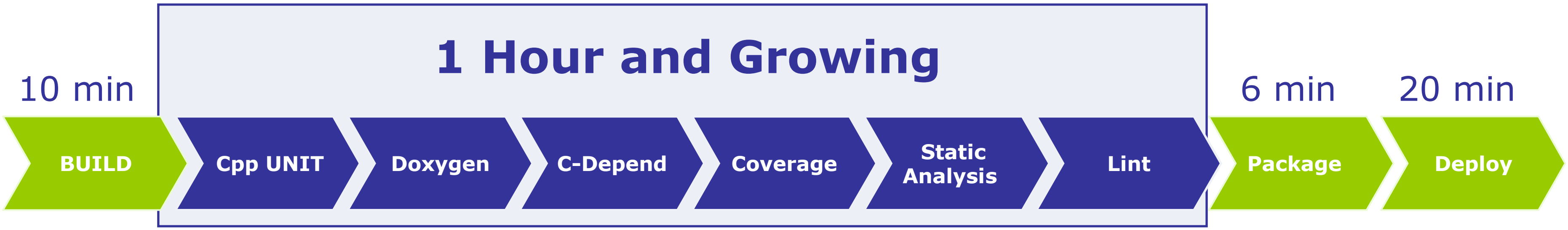
A typical Software Production process



1 Hour and Growing

10 min

BUILD

Cpp UNIT

Doxygen

C-Depend

Coverage

Static Analysis

Lint

6 min

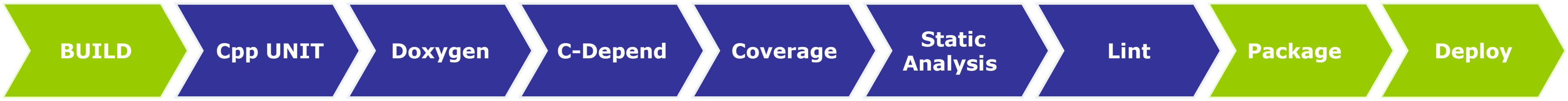
Package

20 min

Deploy

Acceleration

90 Minute Process



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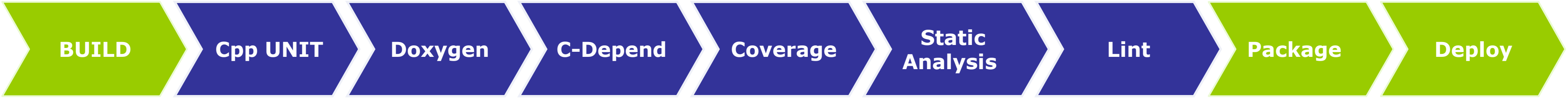
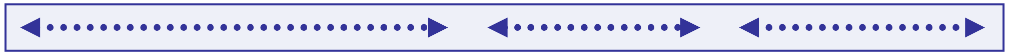


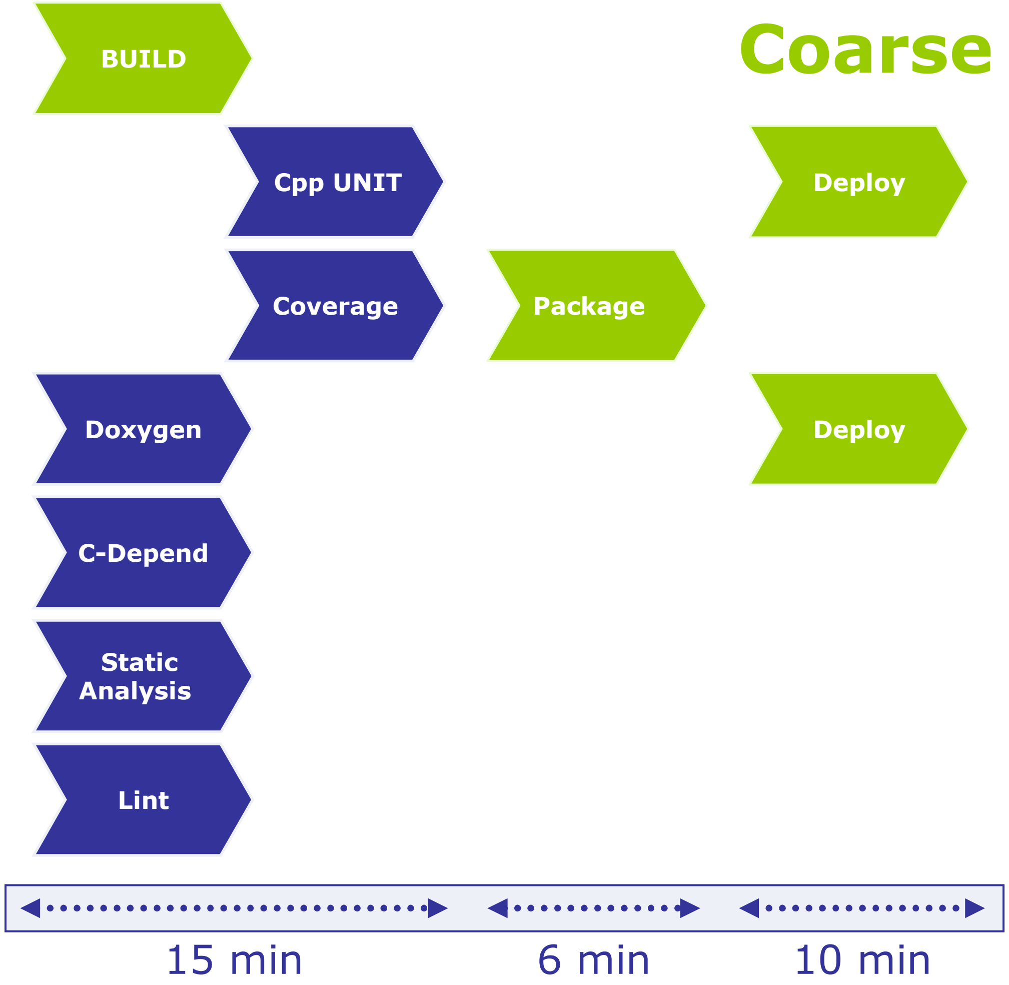


15 min

6 min

10 min

Acceleration

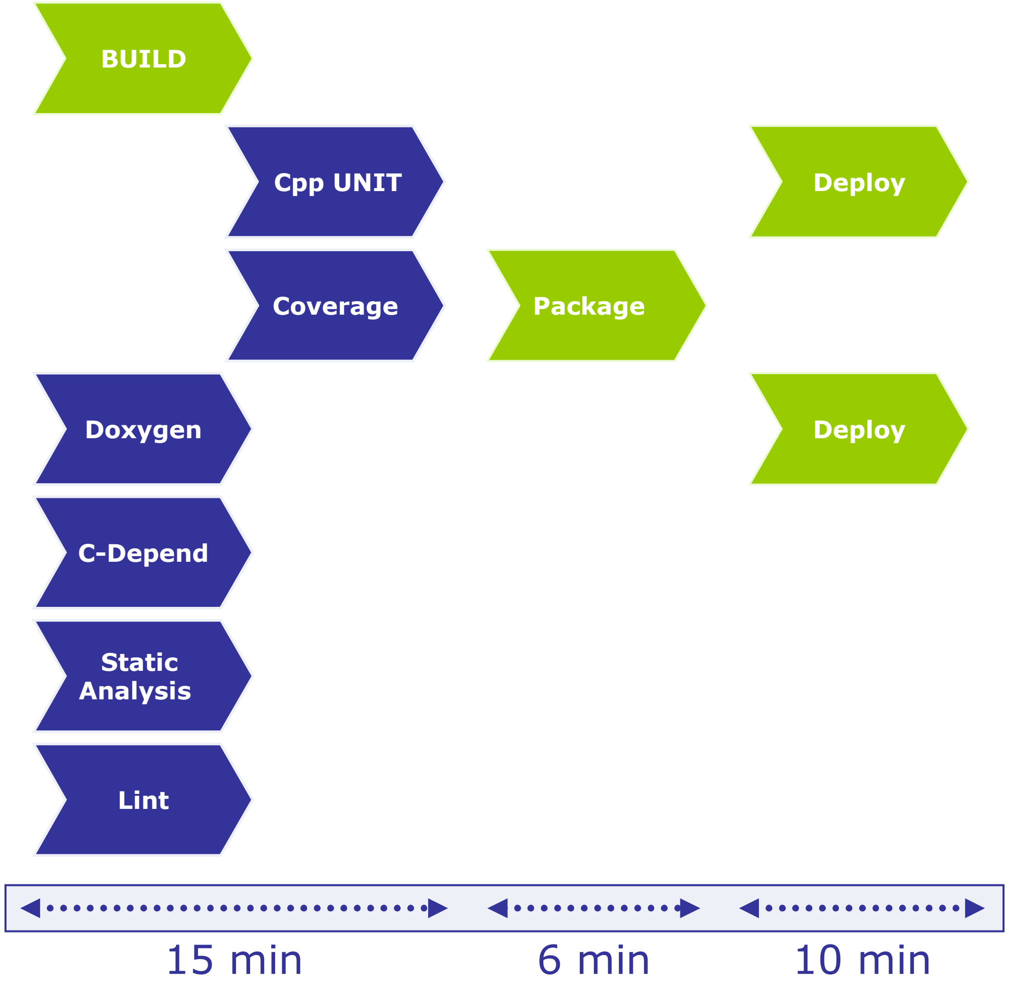


Coarse Grain Parallelism

3x Gain

31 Minutes

Builds Grow


BUILD
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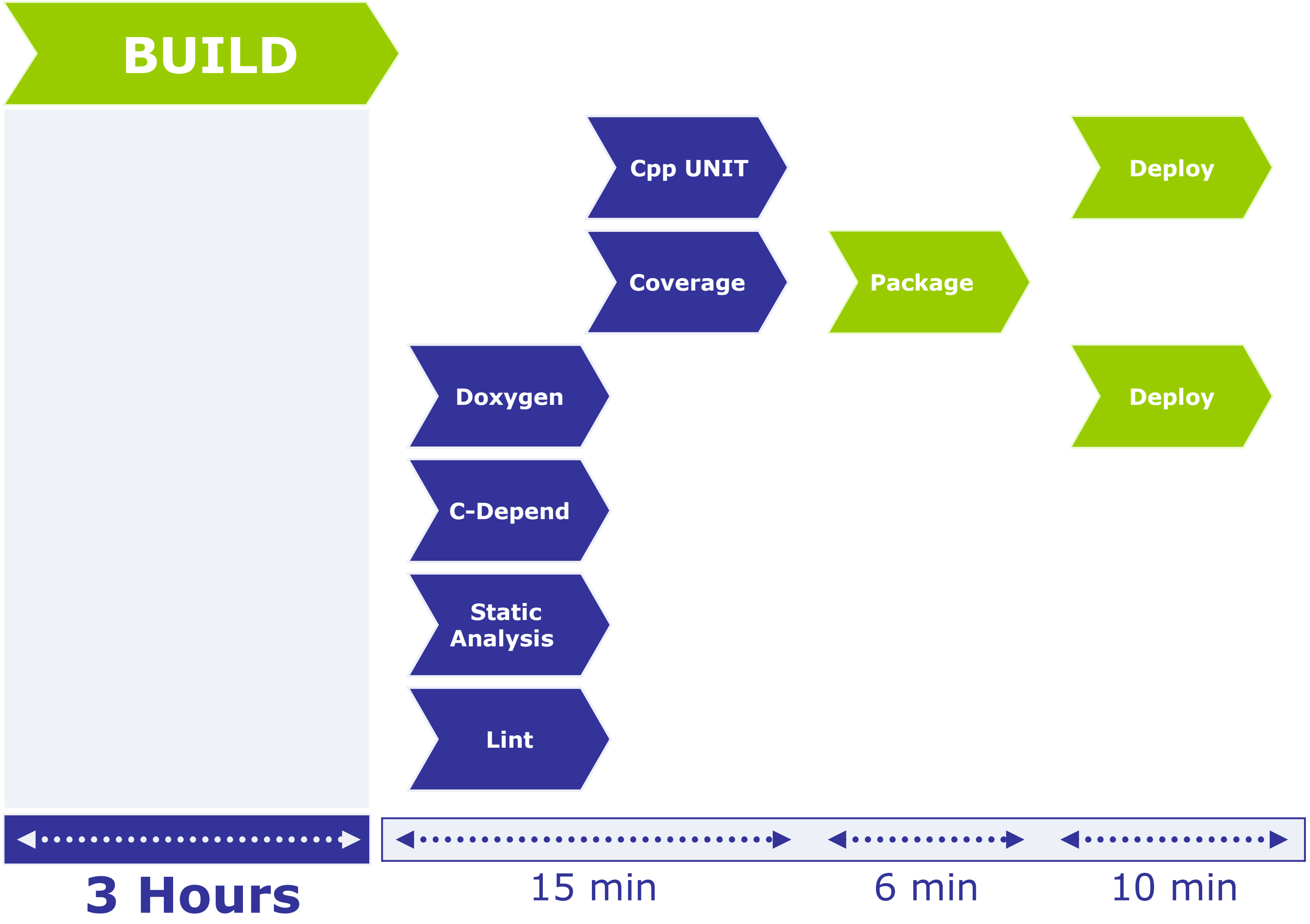
Builds Grow



BUILD

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Deploy

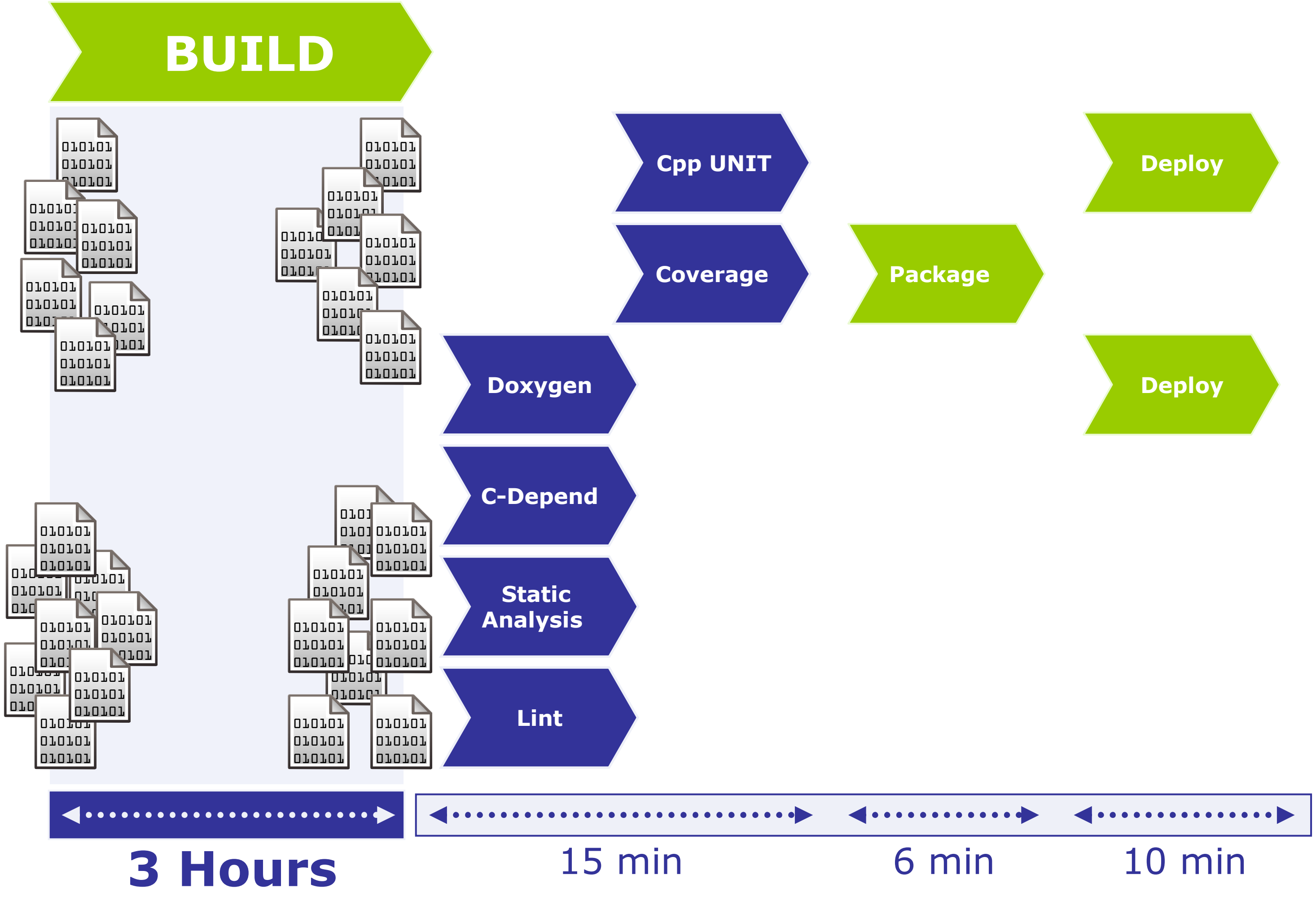
3 Hours

15 min

6 min

10 min

Builds Grow


BUILD
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3 Hours
15 min
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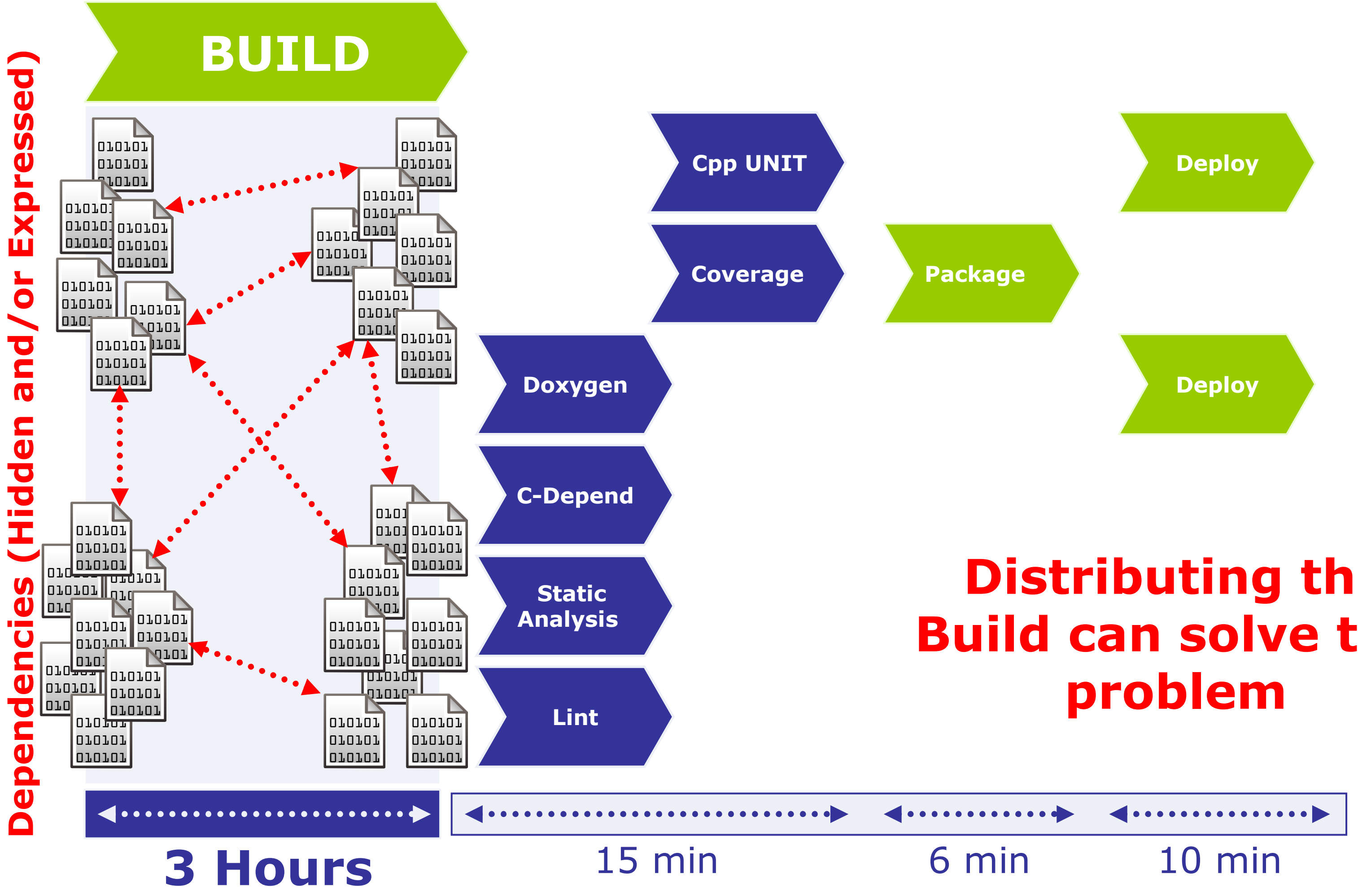
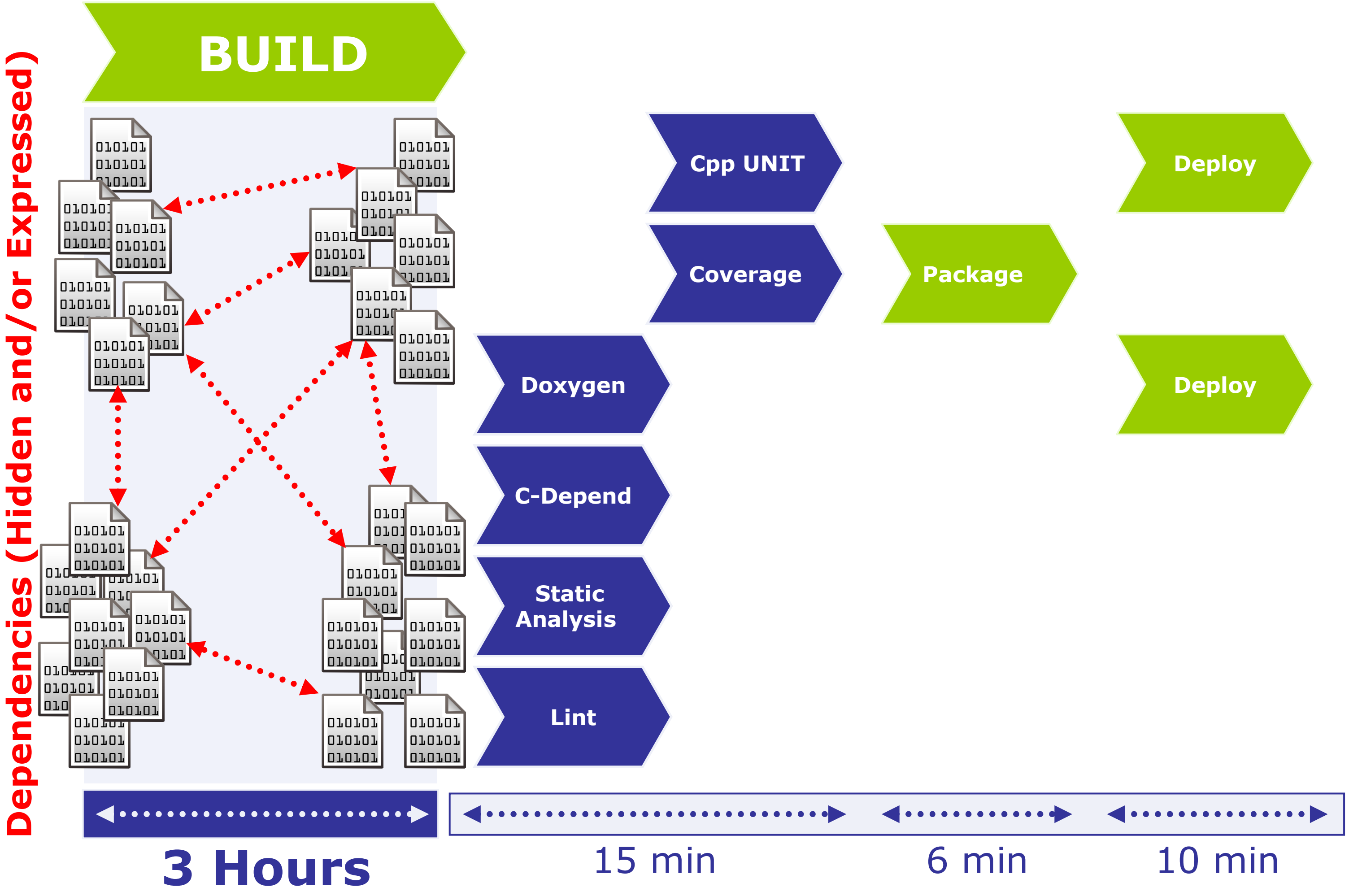
The Problem: Dependencies

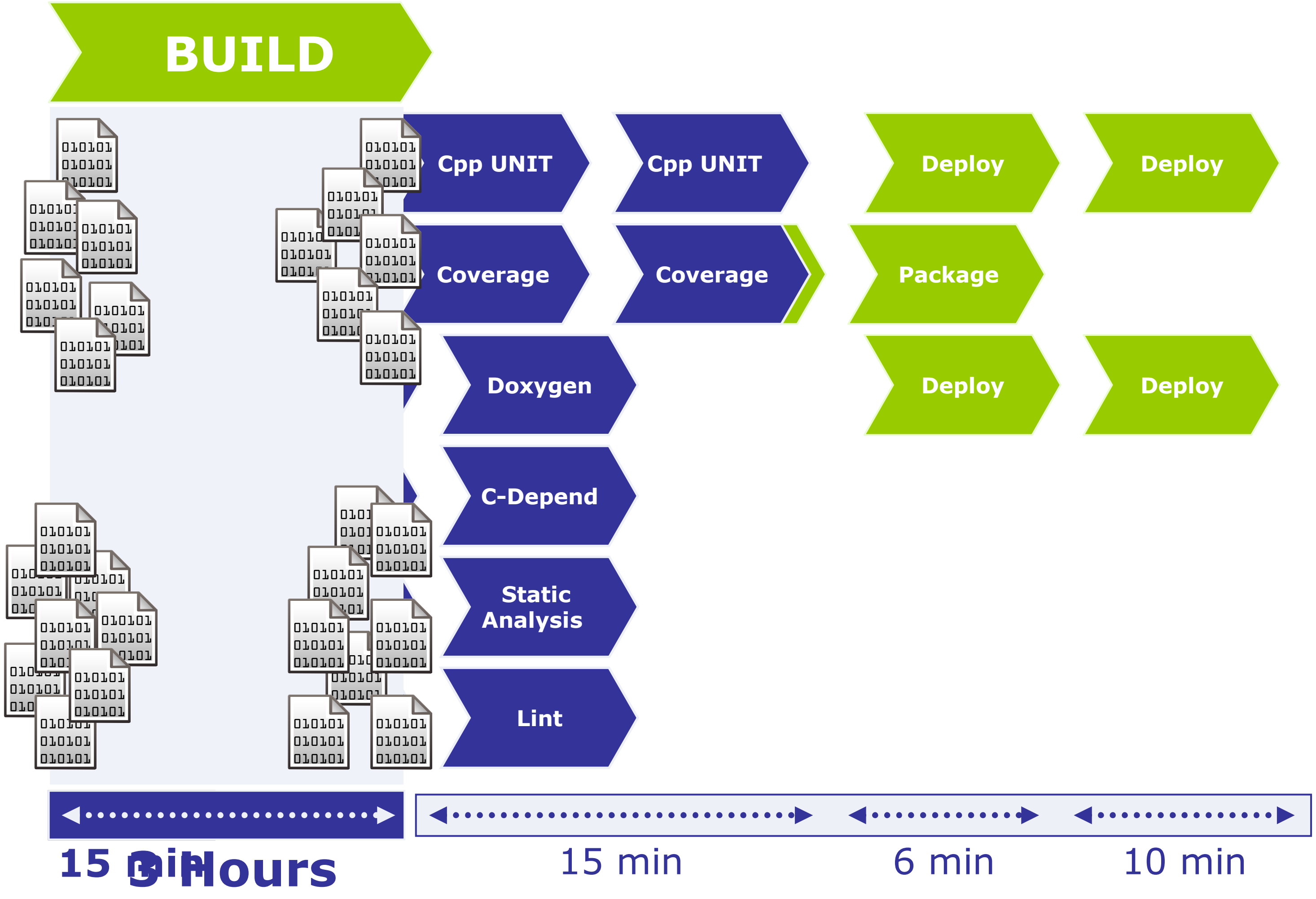


Distributing the Build can solve this problem

The Problem: Dependencies



Fine Grain Parallelism on Builds



Getting There: DIY

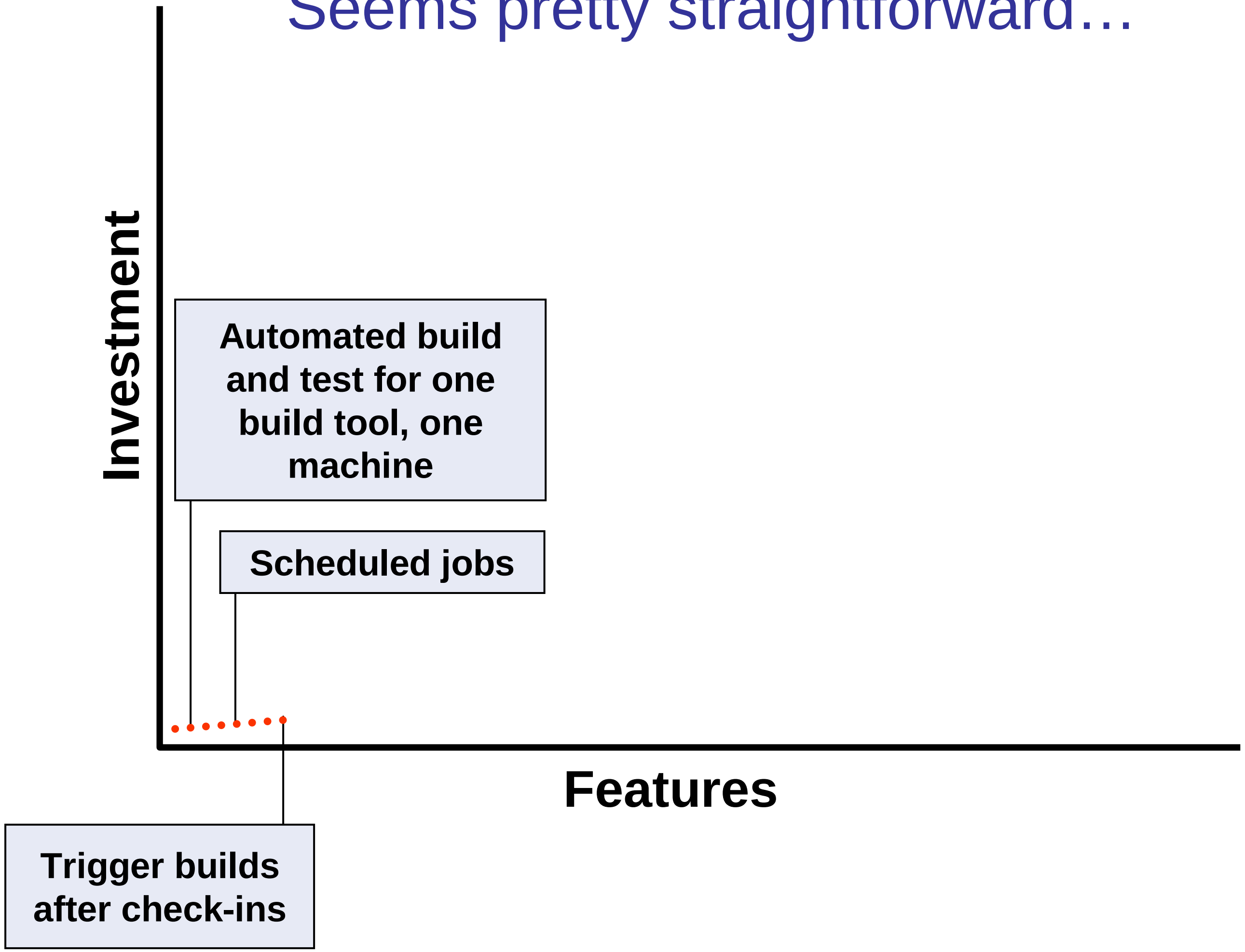
- **Fast builds**
  - Buy lots of SMP hardware and try out GNU Make parallelism or manually parallelize the build.
- **Scheduled builds**
  - Use `cron` for that
- **On demand builds**
  - Build an intranet page, integrate it yourself with the current build and source code management system
- **Stimuli builds**
  - Build ad-hoc script attached to source code management system

DIY

- **You could try that**
- **Before you do think about…**
  - How much time do you have to write all that code?
  - How you are going to manage 200+ builds per day?
  - What build time acceleration is needed?
  - How are you going to manage hardware failure in your build system?
- **Who will manage and maintain the solution**
- **What is the long-term cost and risk**

Build Your Own?

Seems pretty straightforward…



Investment

Features

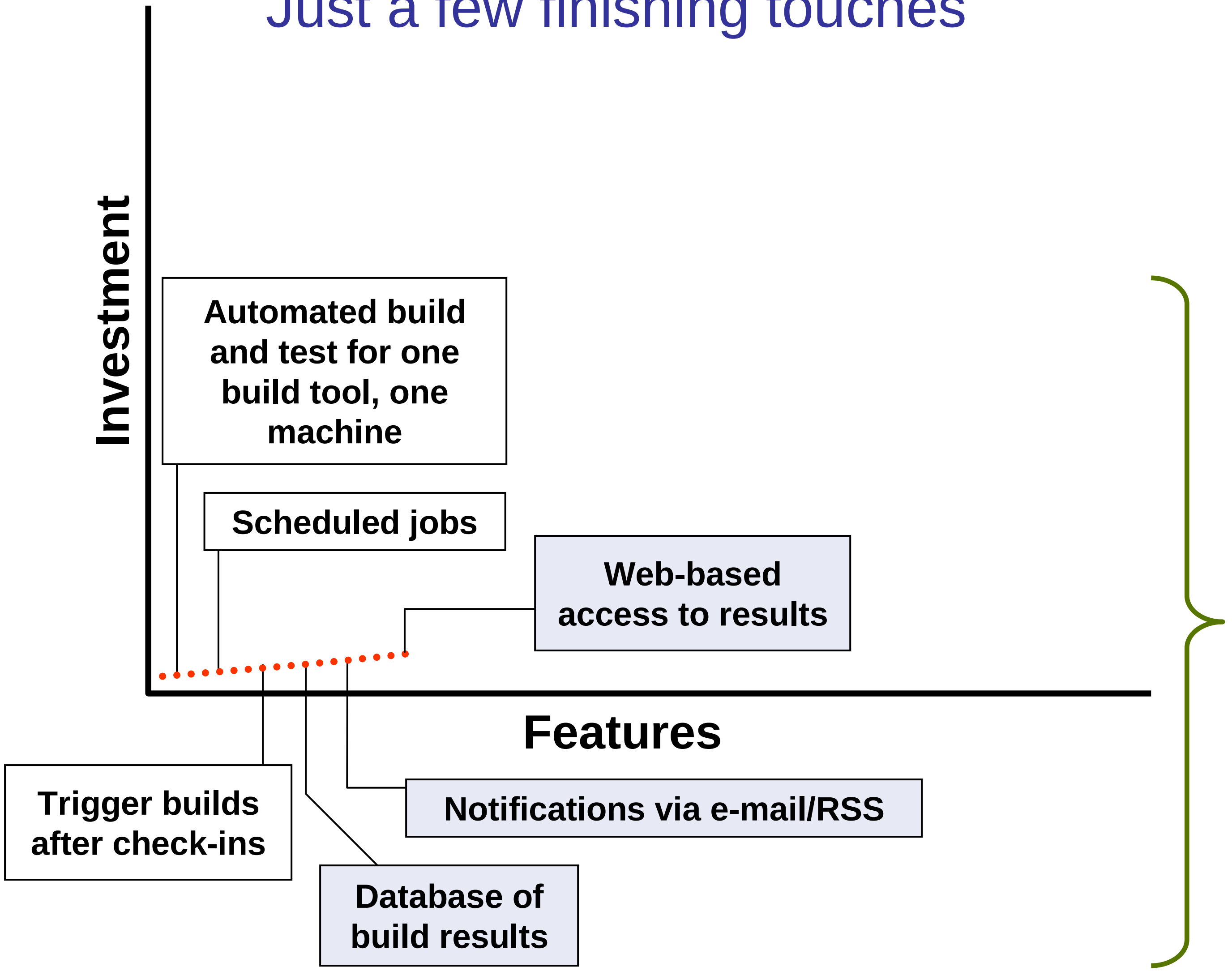
Automated build and test for one build tool, one machine

Scheduled jobs

Trigger builds after check-ins

Build Your Own?

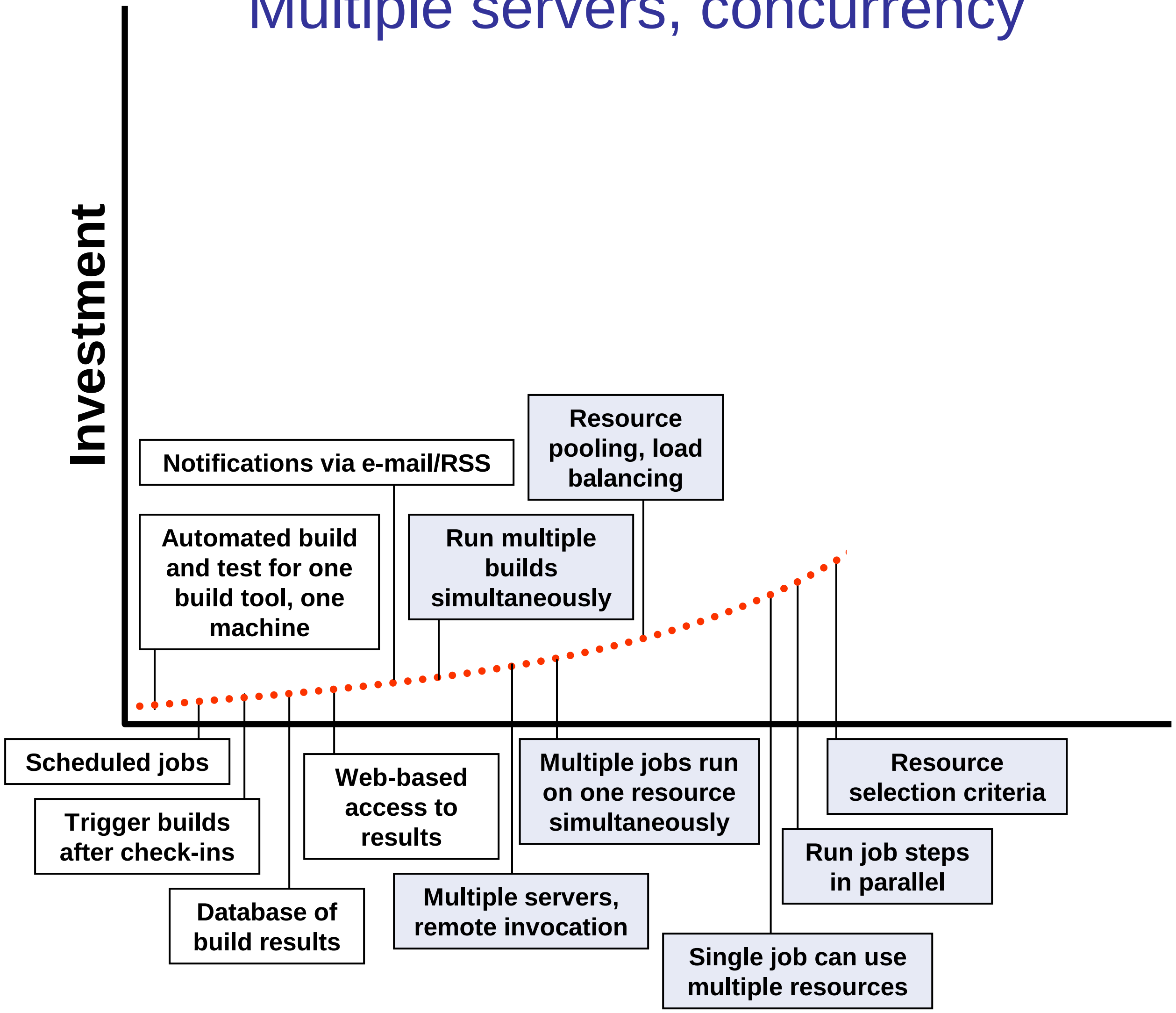
Just a few finishing touches


Investment
Automated build and test for one build tool, one machine
Scheduled jobs
Web-based access to results
Features
Trigger builds after check-ins
Notifications via e-mail/RSS
Database of build results

CruiseControl gives you this for Java/Ant

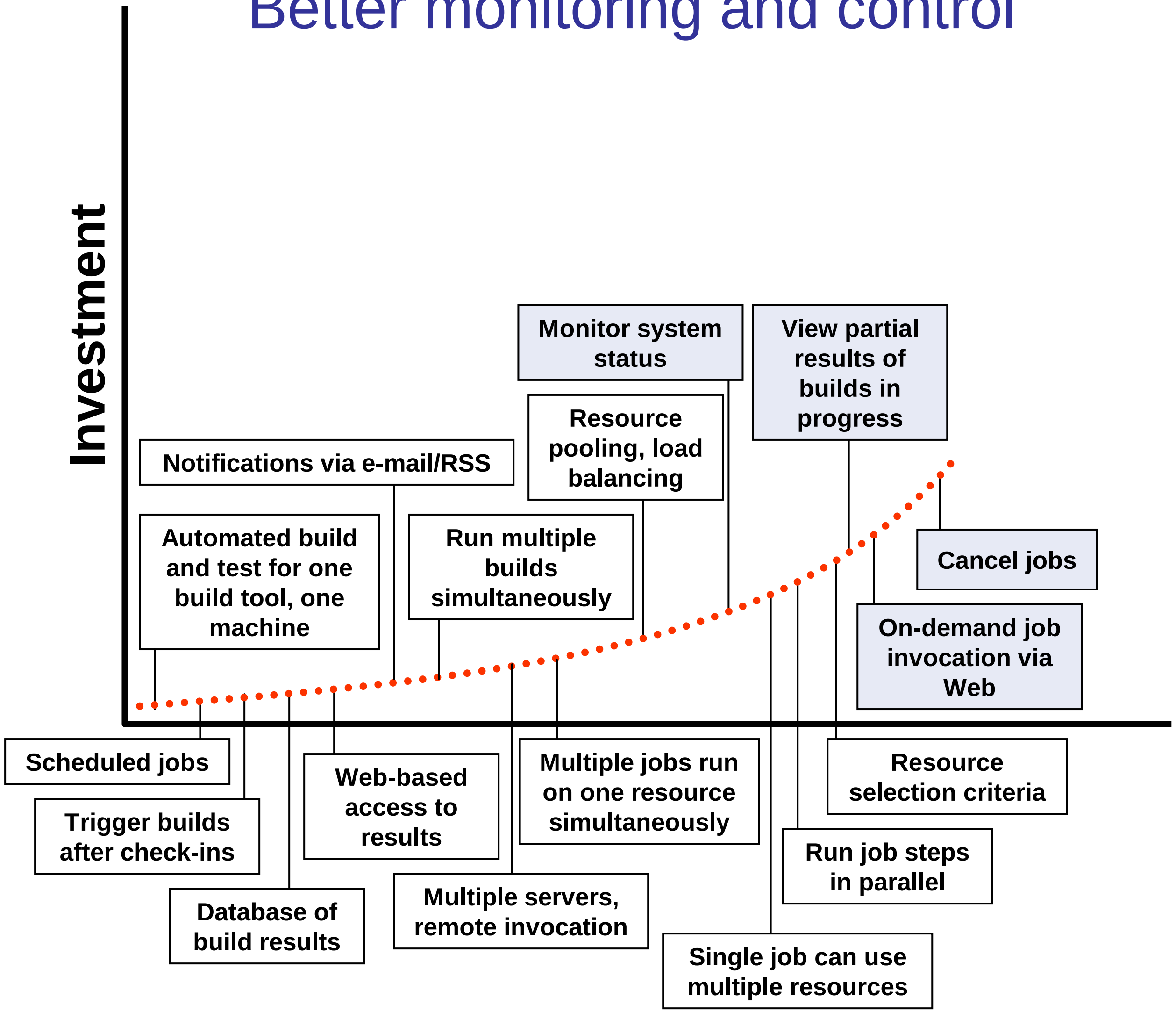
Build Your Own?

Multiple servers, concurrency


Investment
Notifications via e-mail/RSS
Resource pooling, load balancing
Automated build and test for one build tool, one machine
Run multiple builds simultaneously
Scheduled jobs
Trigger builds after check-ins
Database of build results
Web-based access to results
Multiple servers, remote invocation
Multiple jobs run on one resource simultaneously
Single job can use multiple resources
Run job steps in parallel
Resource selection criteria

Build Your Own?

Better monitoring and control



Investment
Monitor system status
View partial results of builds in progress
Resource pooling, load balancing
Notifications via e-mail/RSS
Automated build and test for one build tool, one machine
Run multiple builds simultaneously
Cancel jobs
On-demand job invocation via Web
Scheduled jobs
Trigger builds after check-ins
Database of build results
Web-based access to results
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Multiple jobs run on one resource simultaneously
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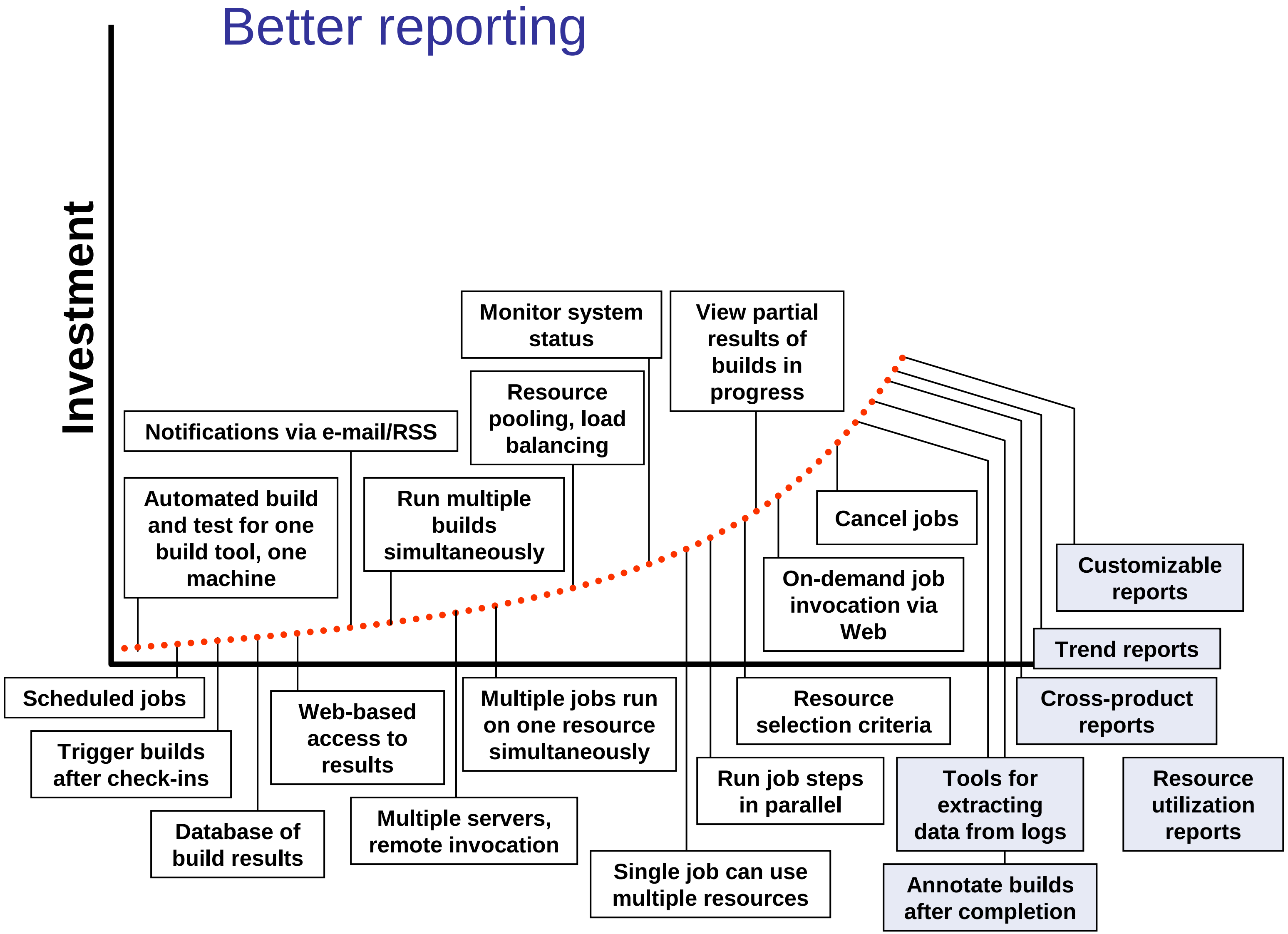
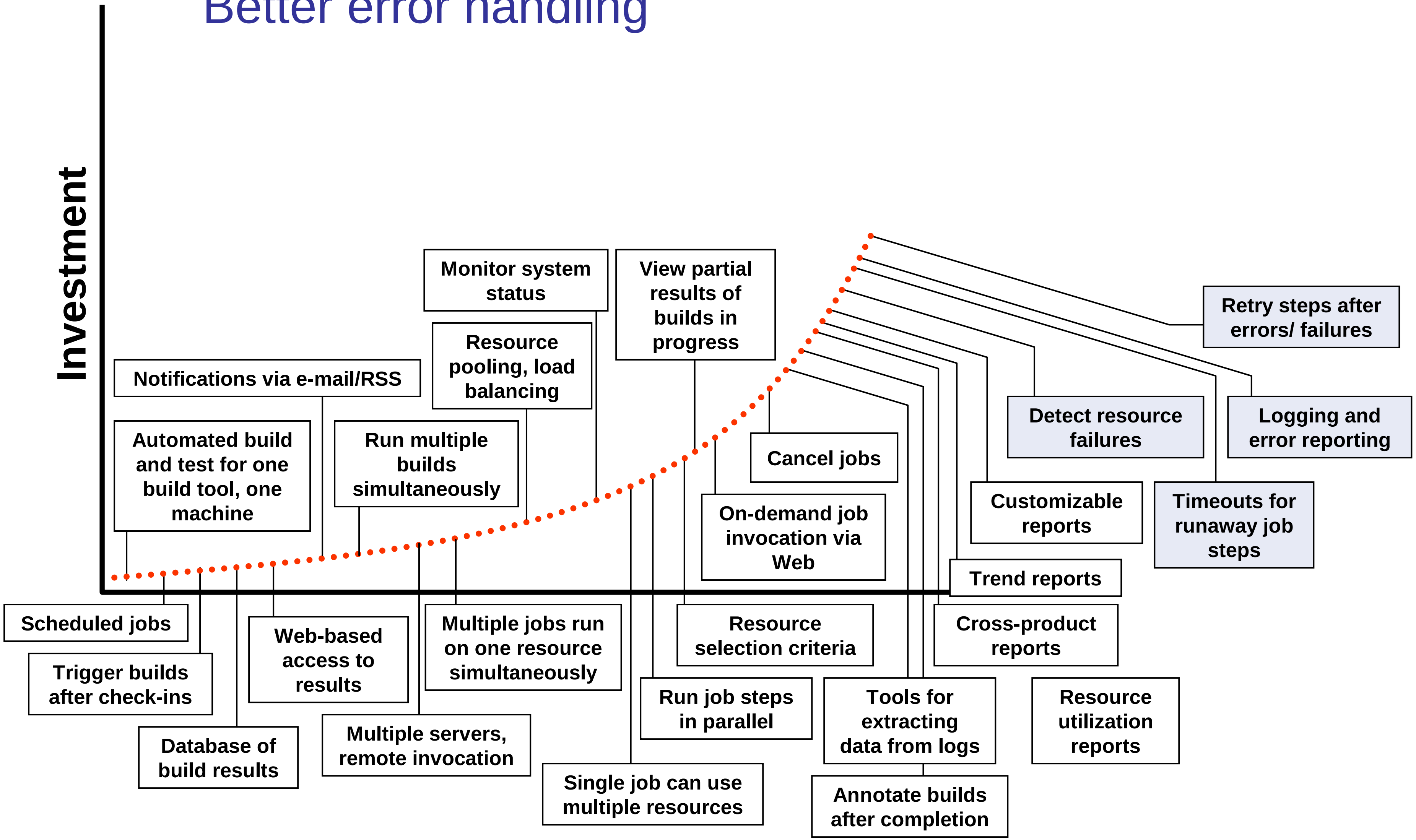
Build Your Own?


Better reporting
Investment
Monitor system status
View partial results of builds in progress
Resource pooling, load balancing
Notifications via e-mail/RSS
Automated build and test for one build tool, one machine
Run multiple builds simultaneously
Cancel jobs
On-demand job invocation via Web
Customizable reports
Trend reports
Scheduled jobs
Trigger builds after check-ins
Database of build results
Web-based access to results
Multiple servers, remote invocation
Multiple jobs run on one resource simultaneously
Single job can use multiple resources
Run job steps in parallel
Resource selection criteria
Tools for extracting data from logs
Annotate builds after completion
Cross-product reports
Resource utilization reports

Build Your Own?

Better error handling



Investment
Scheduled jobs
Trigger builds after check-ins
Database of build results
Automated build and test for one build tool, one machine
Notifications via e-mail/RSS
Web-based access to results
Run multiple builds simultaneously
Multiple servers, remote invocation
Resource pooling, load balancing
Multiple jobs run on one resource simultaneously
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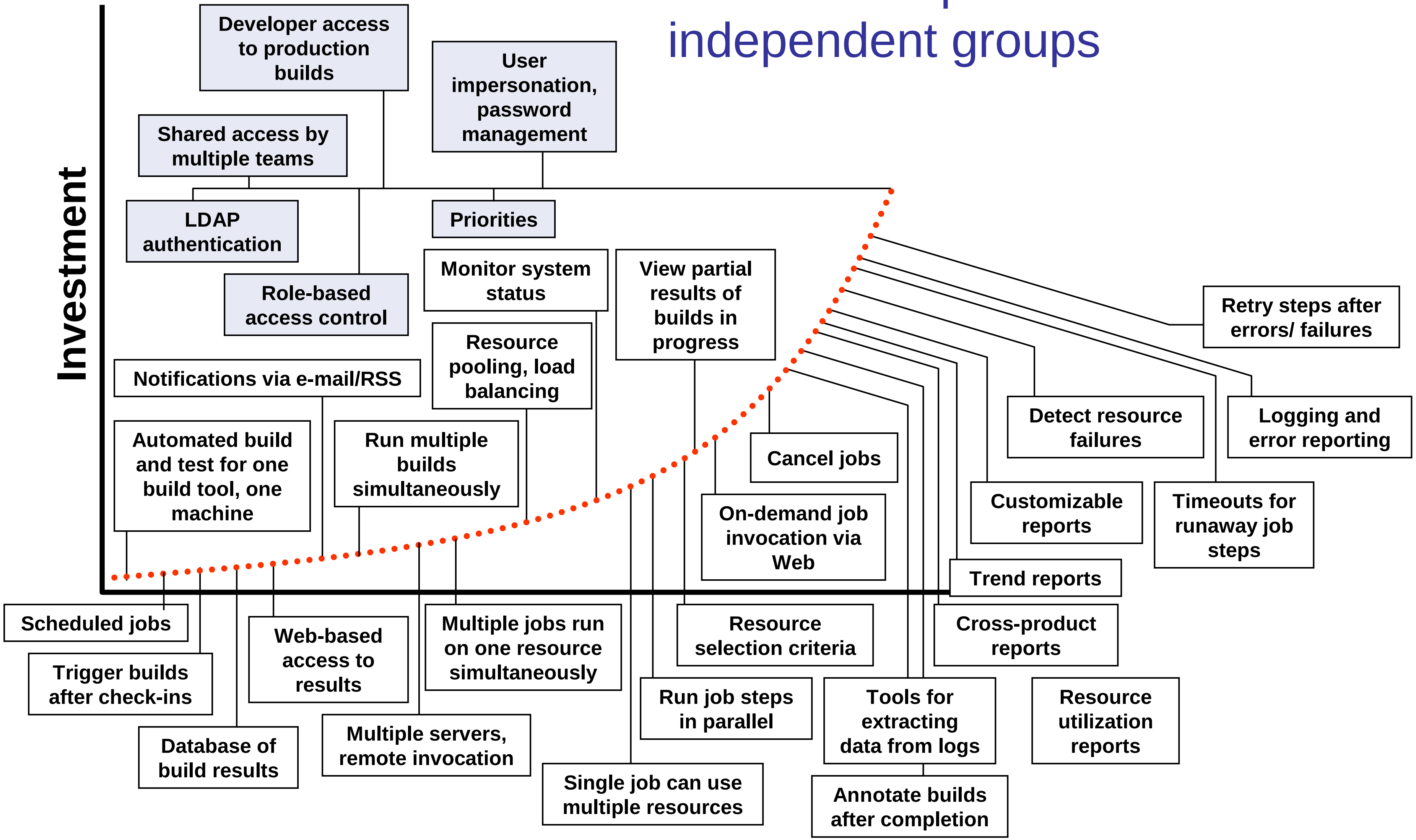
Resource selection criteria
On-demand job invocation via Web
Cancel jobs
Tools for extracting data from logs
Annotate builds after completion
Cross-product reports
Trend reports
Customizable reports
Resource utilization reports
Detect resource failures
Timeouts for runaway job steps
Logging and error reporting
Retry steps after errors/ failures

Build Your Own?



Handle multiple independent groups
Investment
Developer access to production builds
User impersonation, password management
Shared access by multiple teams
LDAP authentication
Priorities
Role-based access control
Monitor system status
View partial results of builds in progress
Retry steps after errors/ failures
Notifications via e-mail/RSS
Resource pooling, load balancing
Detect resource failures
Logging and error reporting
Automated build and test for one build tool, one machine
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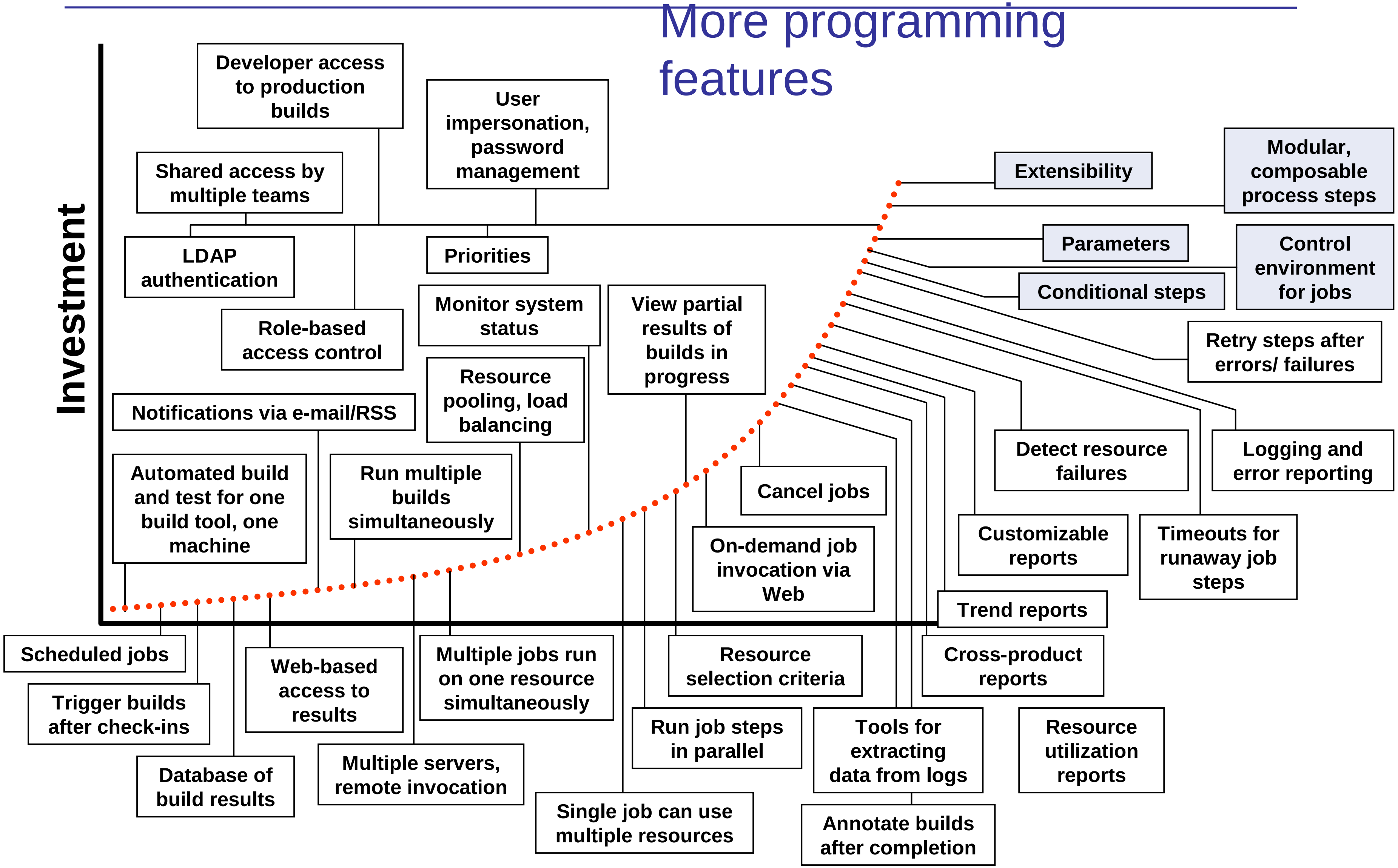
Timeouts for runaway job steps
Trend reports
Scheduled jobs
Web-based access to results
Multiple jobs run on one resource simultaneously
Resource selection criteria
Cross-product reports
Trigger builds after check-ins
Run job steps in parallel
Tools for extracting data from logs
Resource utilization reports
Database of build results
Multiple servers, remote invocation
Single job can use multiple resources
Annotate builds after completion

Build Your Own?


More programming features
Investment
Developer access to production builds
User impersonation, password management
Shared access by multiple teams
LDAP authentication
Priorities
Role-based access control
Monitor system status
View partial results of builds in progress
Resource pooling, load balancing
Notifications via e-mail/RSS
Automated build and test for one build tool, one machine
Run multiple builds simultaneously
Cancel jobs
On-demand job invocation via Web
Extensibility
Modular, composable process steps
Parameters
Control environment for jobs
Conditional steps
Retry steps after errors/ failures
Detect resource failures
Logging and error reporting
Customizable reports
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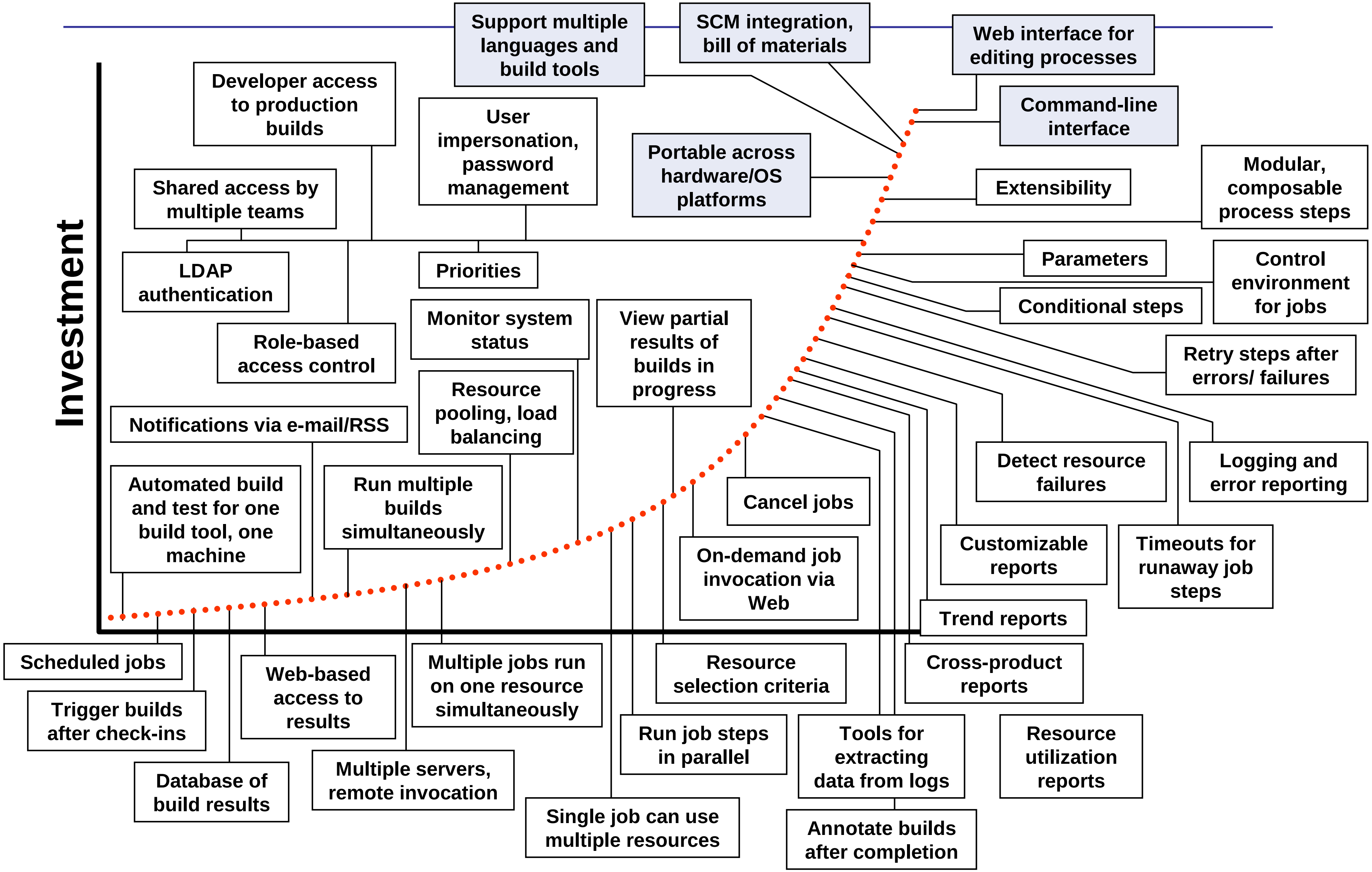
Build Your Own? It Never Ends



Investment

Automated build and test for one build tool, one machine

Scheduled jobs

Trigger builds after check-ins

Database of build results

Web-based access to results

Notifications via e-mail/RSS

Run multiple builds simultaneously

Multiple servers, remote invocation

Multiple jobs run on one resource simultaneously

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On-demand job invocation via Web

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Logging and error reporting

Retry steps after errors/ failures

Conditional steps

Control environment for jobs

Parameters

Modular, composable process steps

Extensibility

Portable across hardware/OS platforms

Command-line interface

Web interface for editing processes

SCM integration, bill of materials

Support multiple languages and build tools

User impersonation, password management

Developer access to production builds

Shared access by multiple teams

LDAP authentication

Role-based access control

Priorities

Q&A

- **Please ask, or email me**
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  - E-mail: info@electric-cloud.com