

Empowering your Business through Software Development

Automated Builds and Continuous Integration

by Serhii Borysov 1/31/2014 2/26/2014 (republished 07/02/2017)

Continuous Integration is ...

... a software development practice where members of a team integrate their work frequently, usually each person integrates at least daily – leading to multiple integrations per day. Each integration is verified by an automated build (including test) to detect integration errors as quickly as possible



Martin Fowler



The Integrate Button



CI is a process that consists of **continuously** compiling, testing, inspecting and deploying source code



What is NOT CI?

- Scheduled integration points
- •Building via IDE
- Continuous compilation



What Is the Value of CI?

- Reduce risks
- Reduce repetitive manual processes
- Generate deployable software at any time and at any place
- Enable better project visibility
- Establish greater confidence in the software product from the development team



CI & Agile



"Our highest priority is to satisfy the customer through early and **continuous** delivery of valuable software"

Agile Manifesto



What you need to implement CI?

- Team willingness
- Version Control System
- Automation-ready
 - Build scripts
 - Automated tests
 - (Optional) Code audit
 - Static code quality analysis
 - Even Architecture verification
- CI tool (checkout, build, run, publish)
- (Optional) Visualization tool (CI tool plugins, Sonar, IDE plugins)



When to Start Doing CI?



- Early in the project is the best time
- Later in the project this may be problematic
 - ✓ No time for such things
 - People are under pressure and resist the changes
 - Start slowly step by step (daily build, only compilation, small test suites)



When Not Cl

- Tests are not developed and maintained
- Nobody cares for failures on CI server
- Experimental Development or Prototyping
- On projects that do not change frequently (Maintenance)
- On projects with only one developer
- On small-budget projects which cannot have separate server for CI



Testing Included in CI

- Unit
- Integration
- Functional
- Acceptance
- Performance
- Database script and utilities
- Deployment and updating scripts
- Everything you can automate, even UI and usability testing





CI best practice

Single Source Repository

- One team has one repository holding the mainline (trunk)
- Checkout must include everything needed for the build

Automate the Build

- Use a script or a build tool (e.g. Maven, Ant)
- Manage dependencies
- Make the build fast
- Show all warnings and errors
- Fail early



CI best practice

- Make your build self-testing
 - Run tests as part of the build process
 - Provide rapid feedback
 - Run long-running tests nightly but short-running tests after each commit
 - Test in the clone of production environment
- Everyone Commits Often
- Sends results of each failed/unstable build to the whole team
- Nightly build sends info about all commits which were done during previous day
- Automate Deployment (NOT for Production)
- Automated code quality audits



CI best practice

• Automate as much as You can with common sense in mind





Code quality audit

Is there something to test?





Everyone can see what's happening

- Every team member has access to the results
- Build history and build status reports to make analysis and see project health level
- Build status indicators to understand current build state
- Use funny ways to visualize build status (lava lamps, separate monitor for dashboard)









CI Team Rules



- Person who breaks the build should prepare interesting material for internal technical meeting
- Person who breaks the build should buy a pizza for the next demo celebration
- Special artifact like hat or cup for person who breaks the build
- Dashboard with funny personas for each team member and build status



CI Workflow







CI Workflow





Staged Build Process





Building Software at every Change





CI Workflow



SoftServe

Different environments





Running a private build to reduce integration build errors





Continuous Integration Delivery Deployment





Continuous Integration Delivery Deployment





Continuous Integration Delivery Deployment





Questions



