SoftServe

Empowering your Business through Software Development

Automated Builds and Continuous Integration

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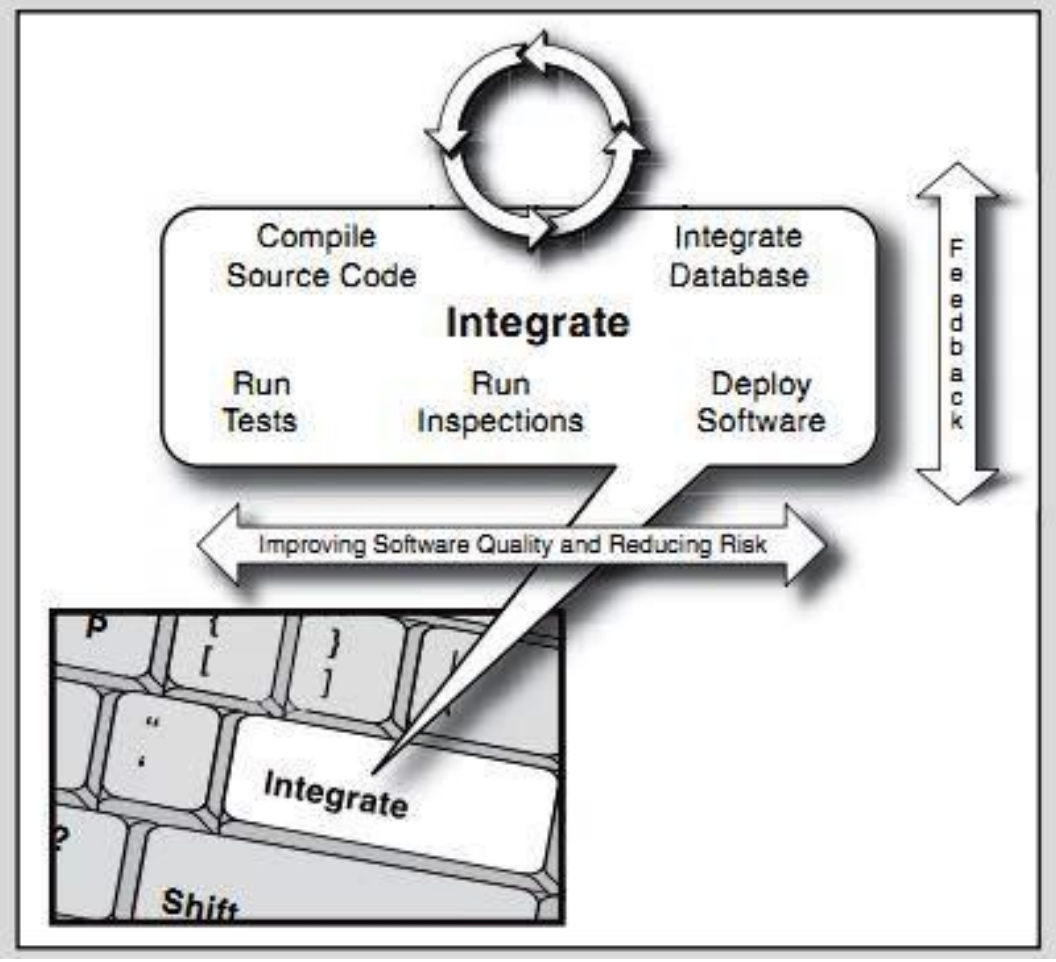
Continuous Integration is …

… 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

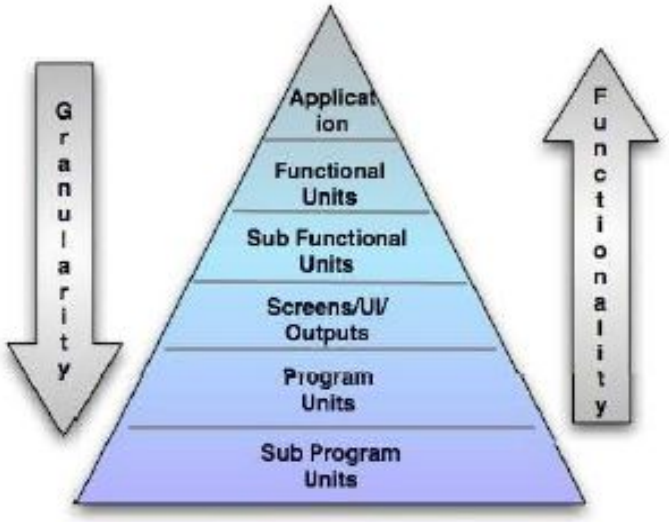
  ✔ No time for such things
  ✔ People are under pressure and resist the changes
  ✔ Start slowly step by step (daily build, only compilation, small test suites)

When Not CI

- 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

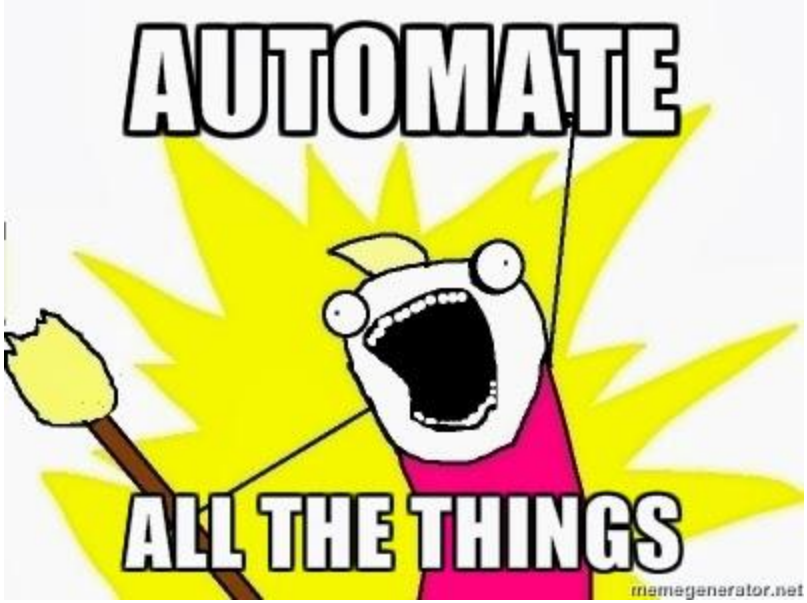
CI best practice

- 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

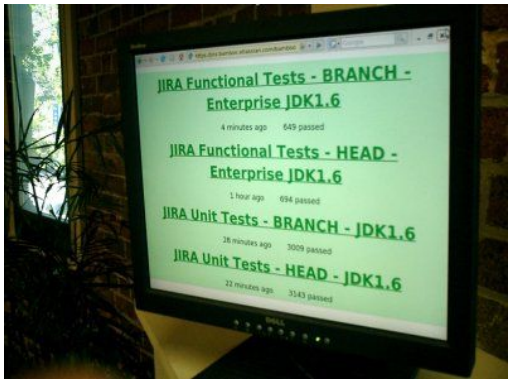


Code quality audit

Is there something to test?

Everyone can see what's happening

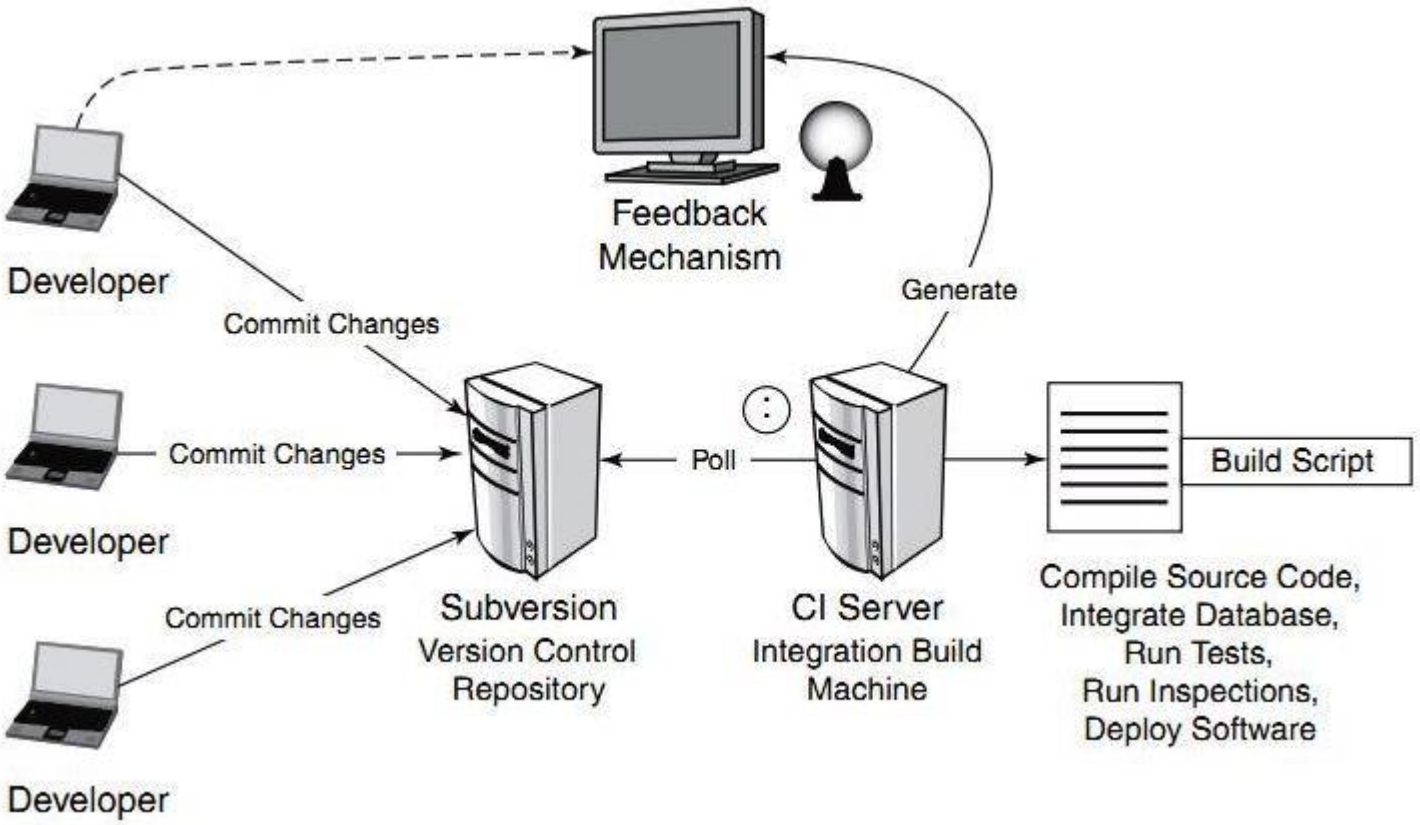
- Every team member has access to the results
- Build history and build status reports to make analysis and see project health level
- Build status indicators to understand current build state
- Use funny ways to visualize build status (lava lamps, separate monitor for dashboard)



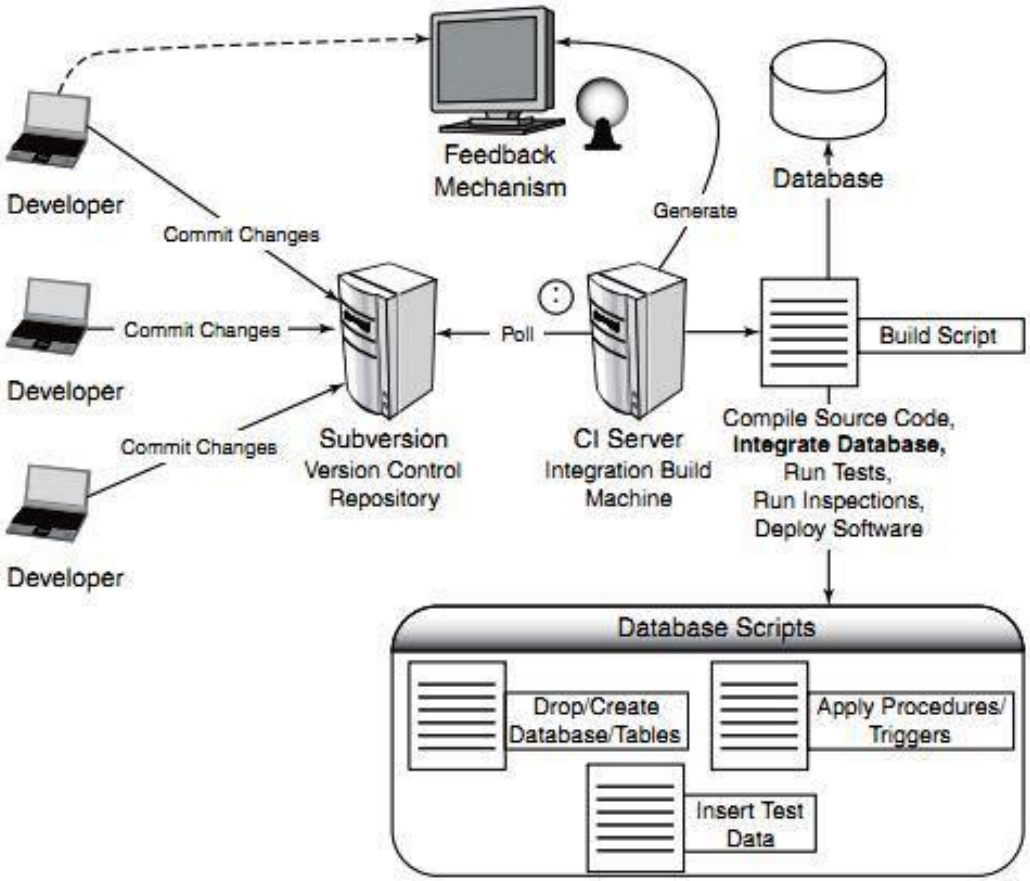
CI Team Rules

- 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


Feedback
Mechanism
Developer
Commit Changes
Generate
Commit Changes
Developer
Poll
Build Script
Commit Changes
Subversion
Version Control
Repository
CI Server
Integration Build
Machine
Compile Source Code,
Integrate Database,
Run Tests,
Run Inspections,
Deploy Software
Developer

CI Workflow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Subversion
Version Control
Repository
CI Server
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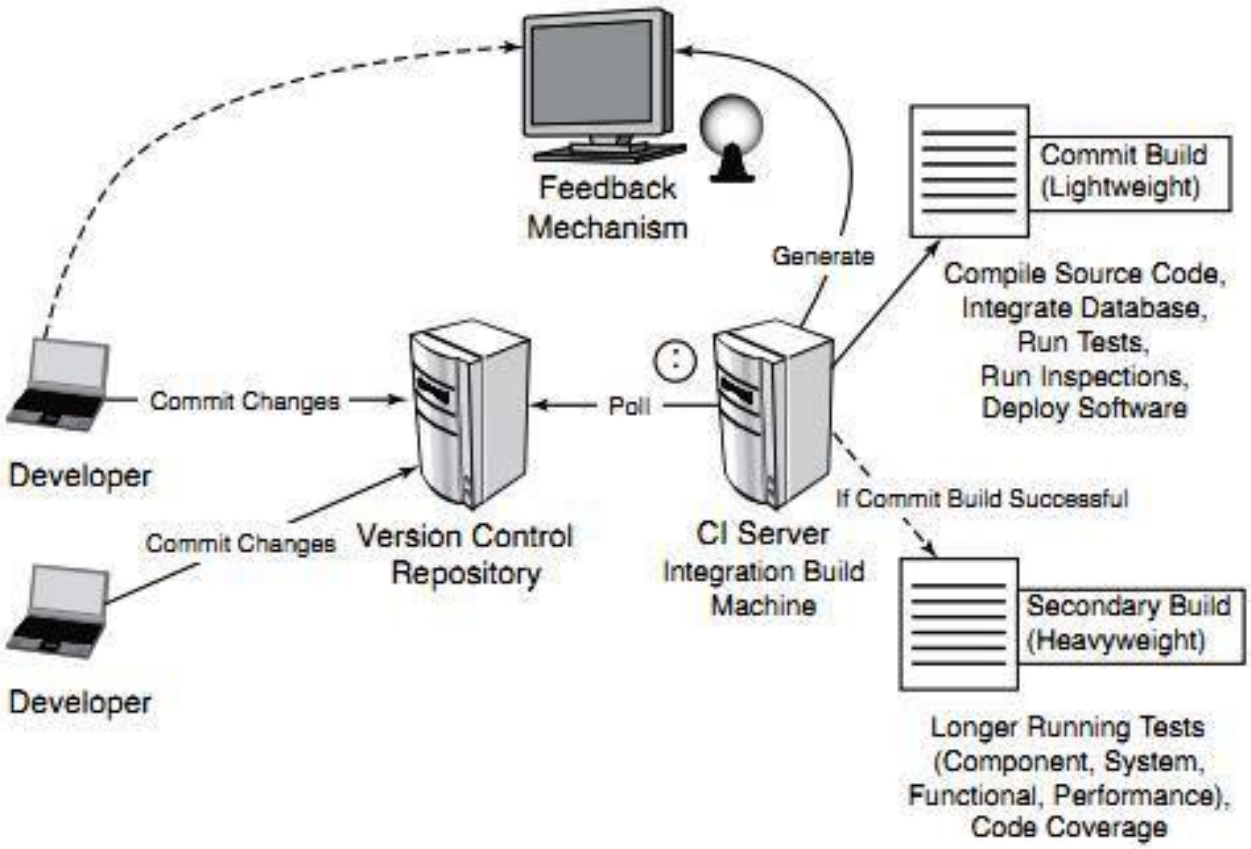
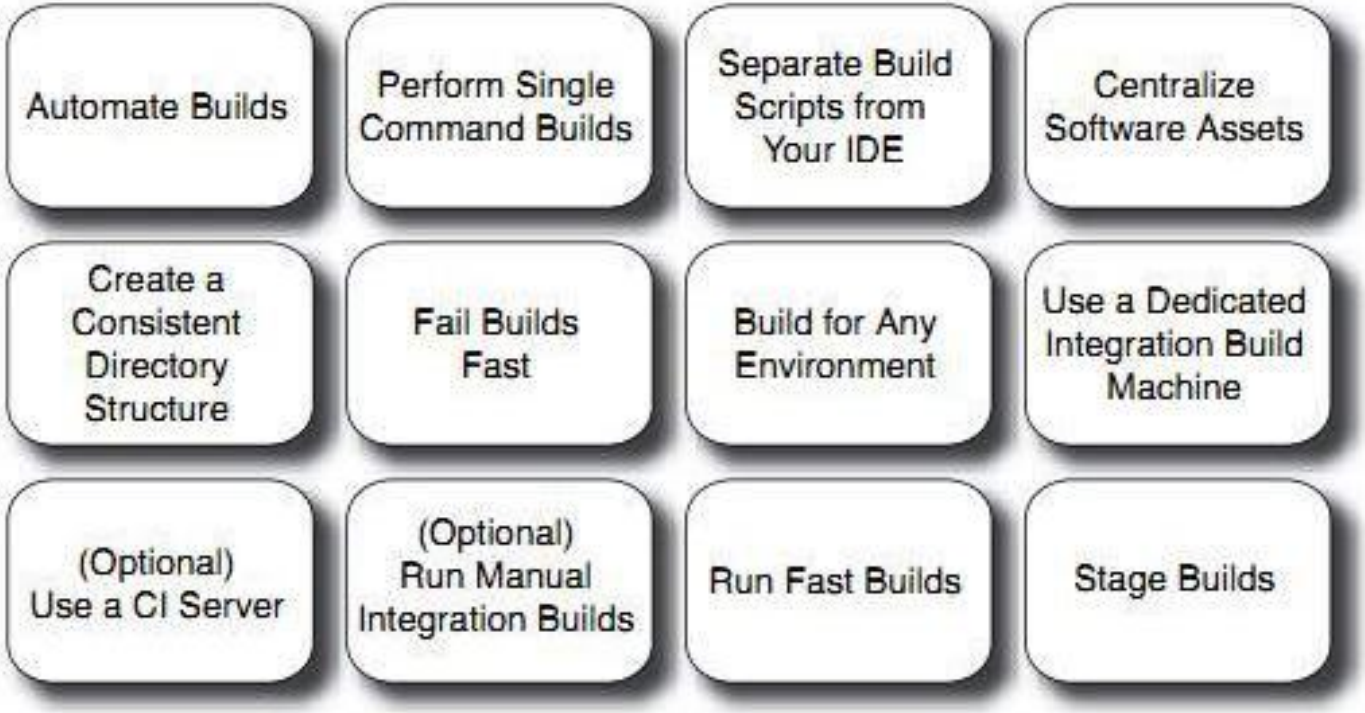
Machine
Compile Source Code,
Integrate Database,
Run Tests,
Run Inspections,
Deploy Software
Developer
Database Scripts
Drop/Create
Database/Tables
Apply Procedures/
Triggers
Insert Test
Data

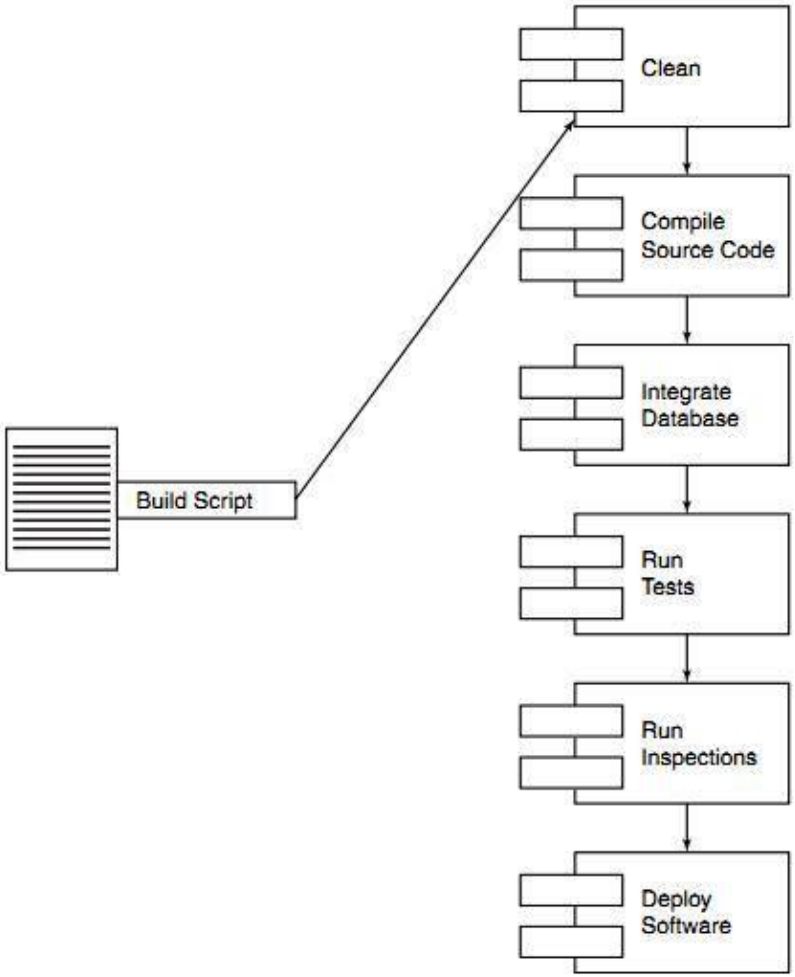
Staged Build Process



Building Software at every Change

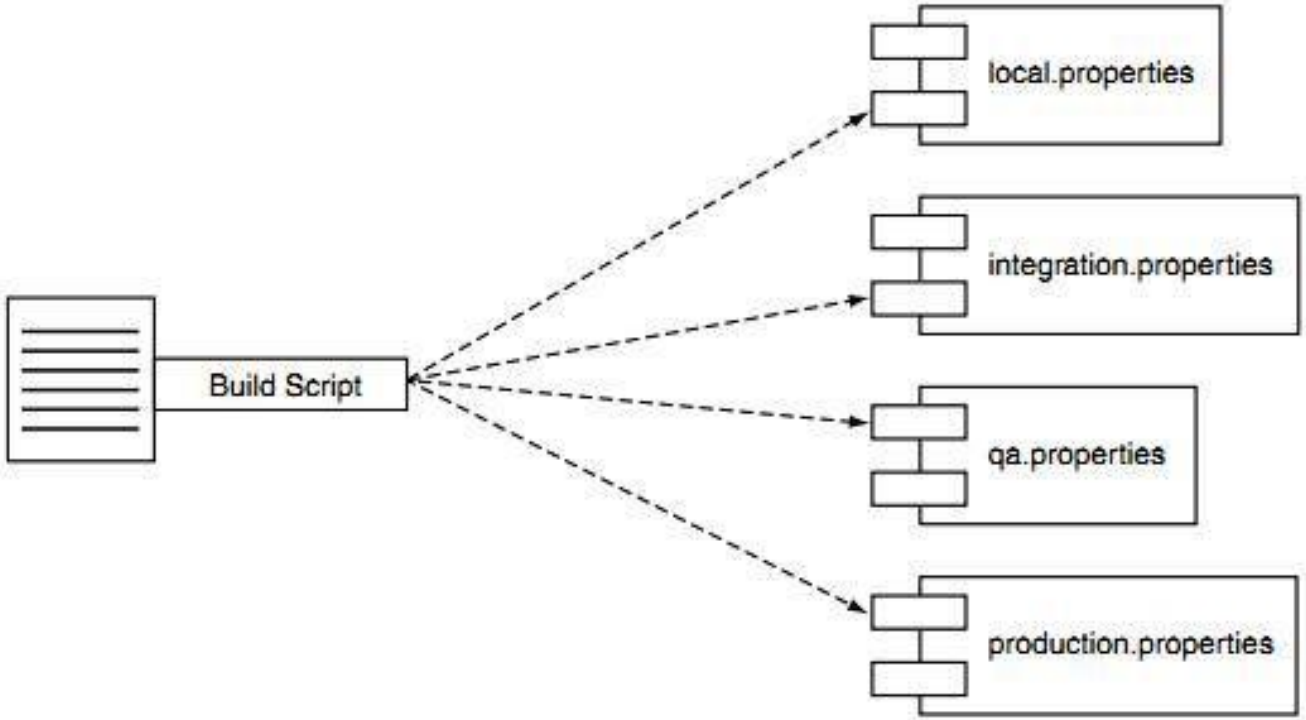


CI Workflow

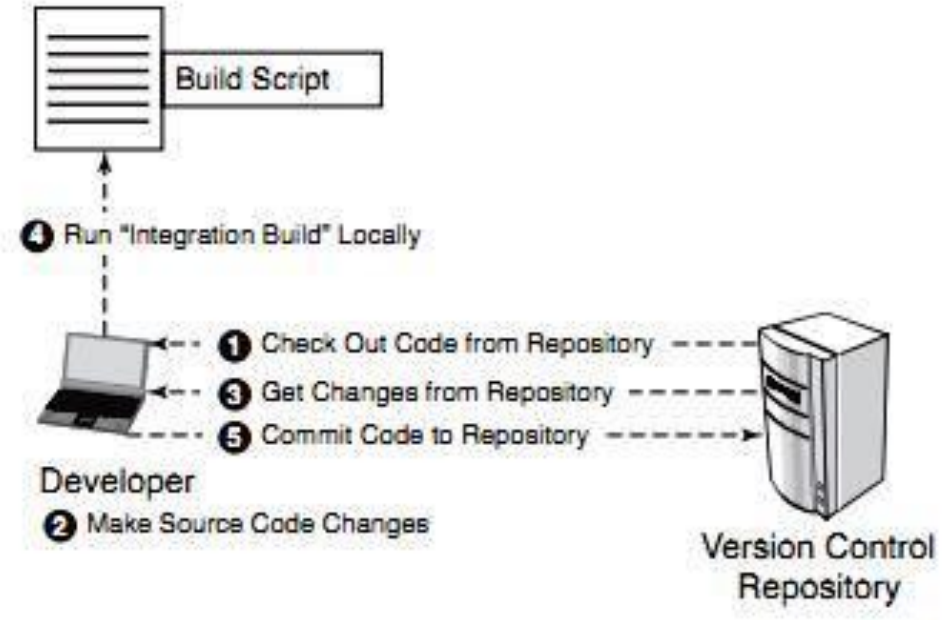


The logical processes of a build script

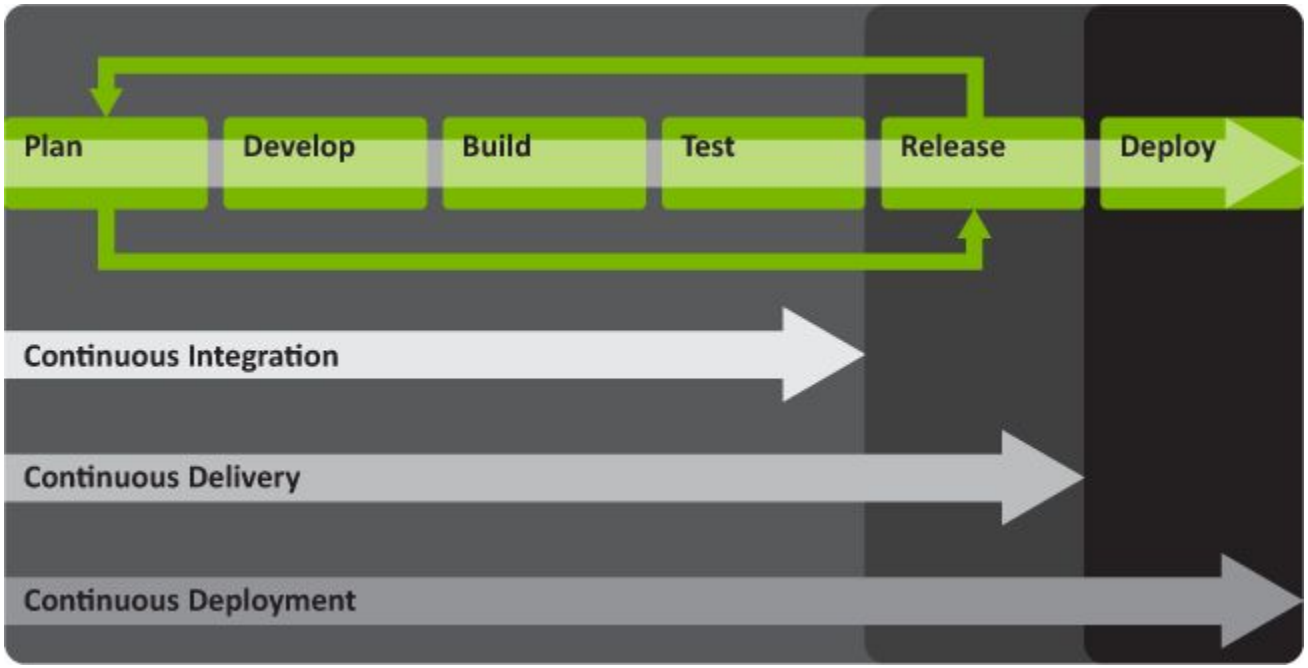
Different environments



Running a private build to reduce integration build errors



Continuous Integration Delivery Deployment



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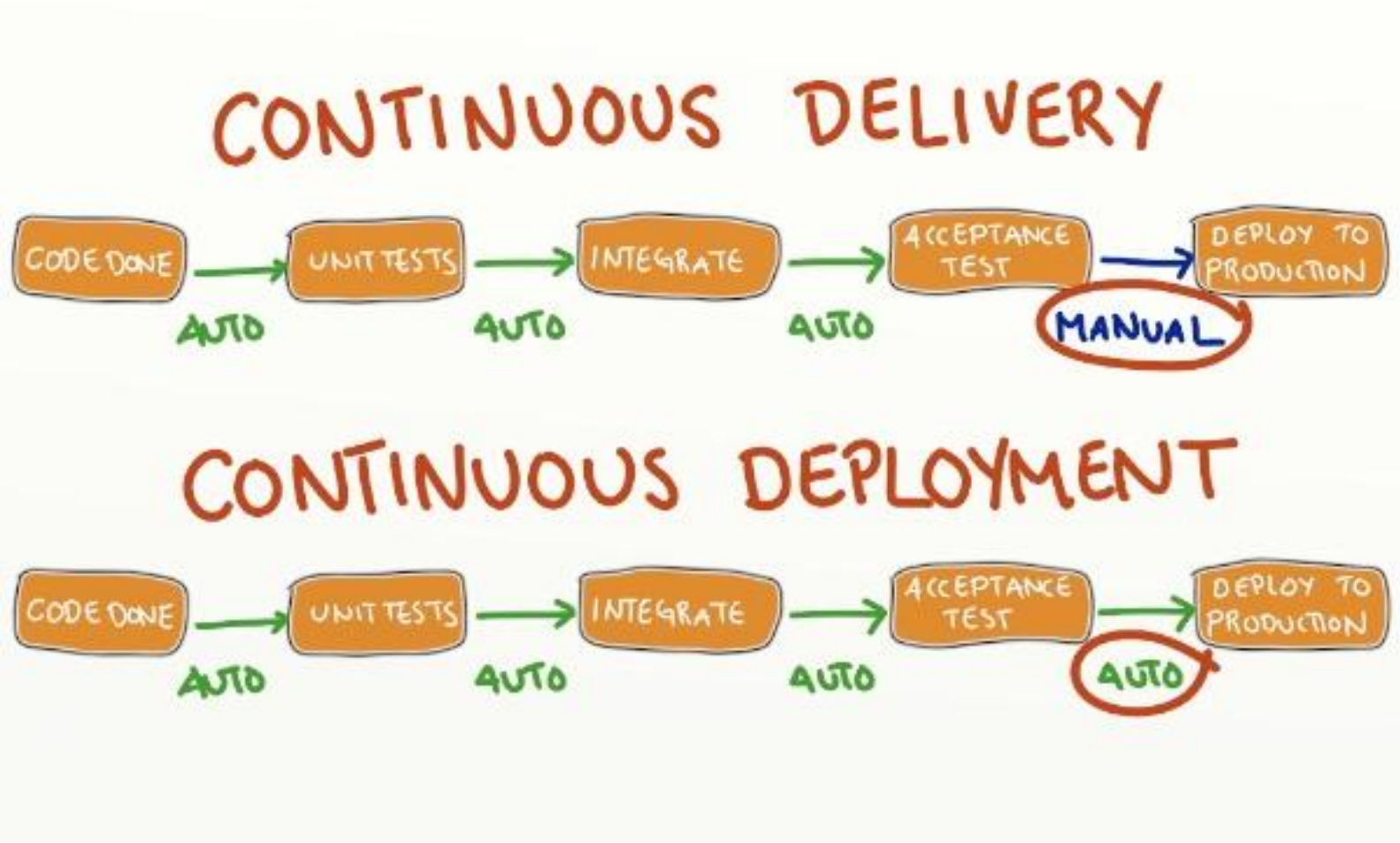

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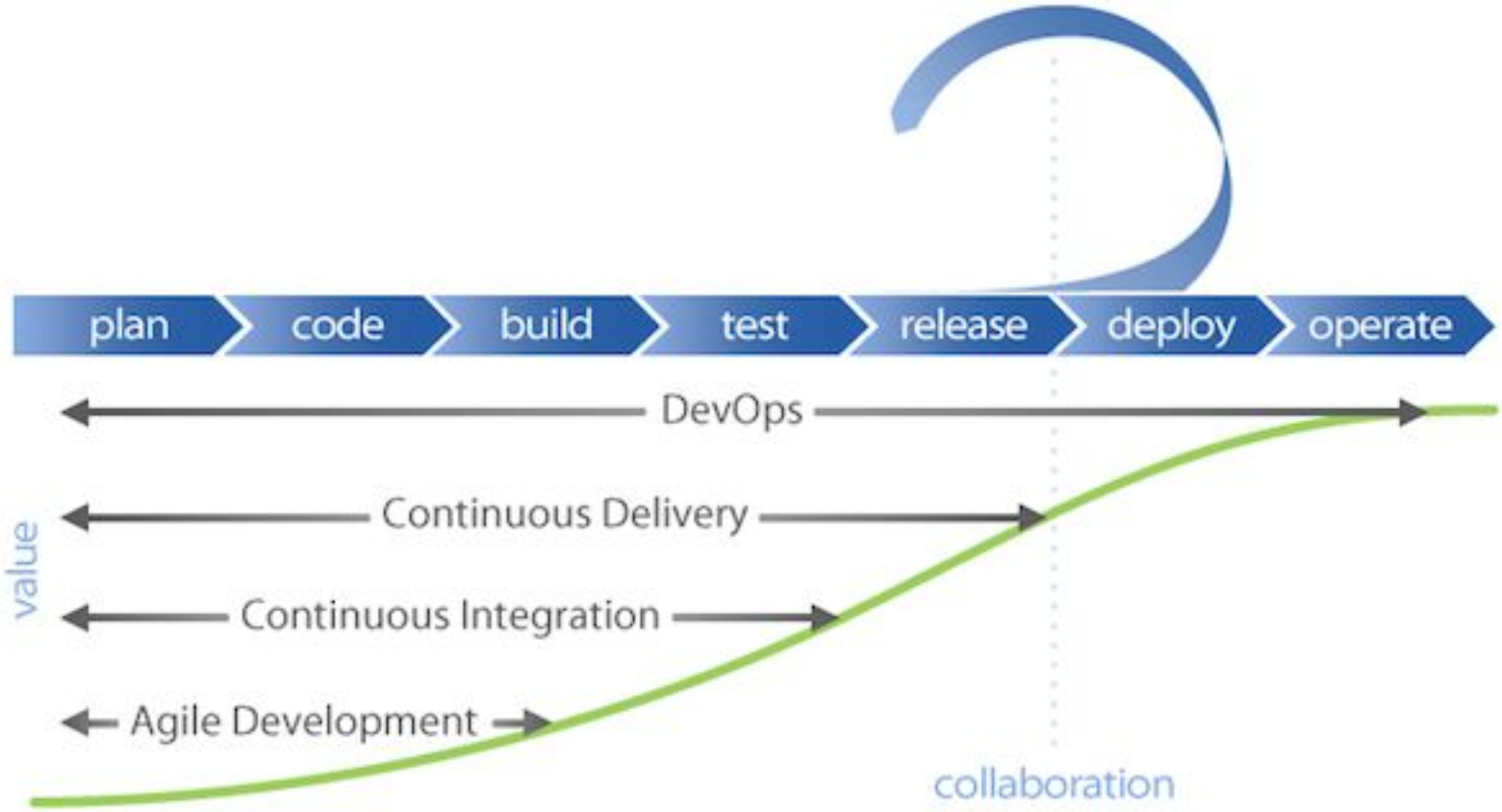

Questions