



Continuous Integration & Best Development Practices in Luxoft

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November 2006

Agenda



- **Introduction**
- **Best development practices**
- **Project Infrastructure**
- **Continuous builds & platforms**
- **Active Software Engineering Quality**
- **Links**

Introduction



- **Who am I?**
- **Scope of my presentation:**
Overview of the following below development practices, how to implement them and how they provide real benefits
 - Automated code review;
 - Automated unit testing & code coverage;
 - Automated functional/integration tests;
 - Continuous integration;
 - Project blogs;
- **Target group of this presentation: Architects, Team Leads, PM, Head of Dev. Departments;**
- **Techniques discussed are applicable to both Formal and Agile methodologies**
 - The goal is software (result), not methodology (process)

Automated code review

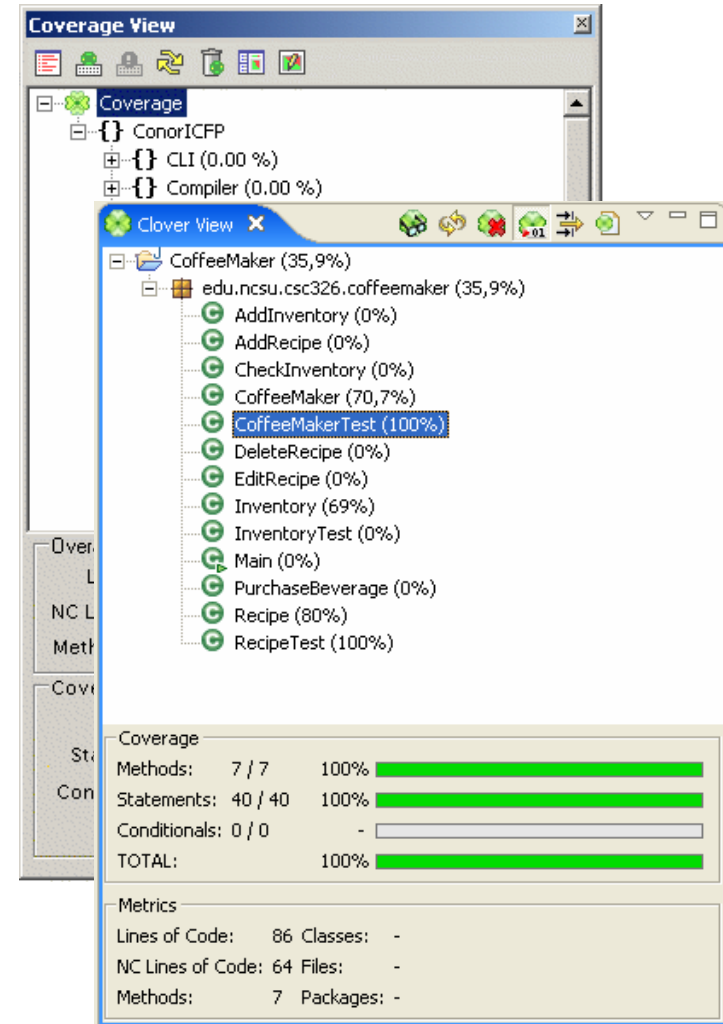
- Automated code review is the first level of code review (2nd – buddy review, 3^d – formal review)
- Run automated code review EACH time within build process
- Corporate Coding Standards is required, as well as updating coding rules for automated code review tools on regular basis
- Publish coding rules updates on corporate portal

Tools	Primary functionality
<ul style="list-style-type: none">■ Java: CheckStyle■ .NET: FxCop	<p><u>General code review tools</u></p> <p>They control the compliance between Corporate Coding Standards and source code in the project</p>
<ul style="list-style-type: none">■ Java: PMD, CPD■ .NET: DevPartnermore	<p><u>Additional code review tools</u></p> <p>PMD allows to find typical bug-patterns</p> <p>CPD allows to find copy-paste source code</p>

Automated unit testing & code coverage

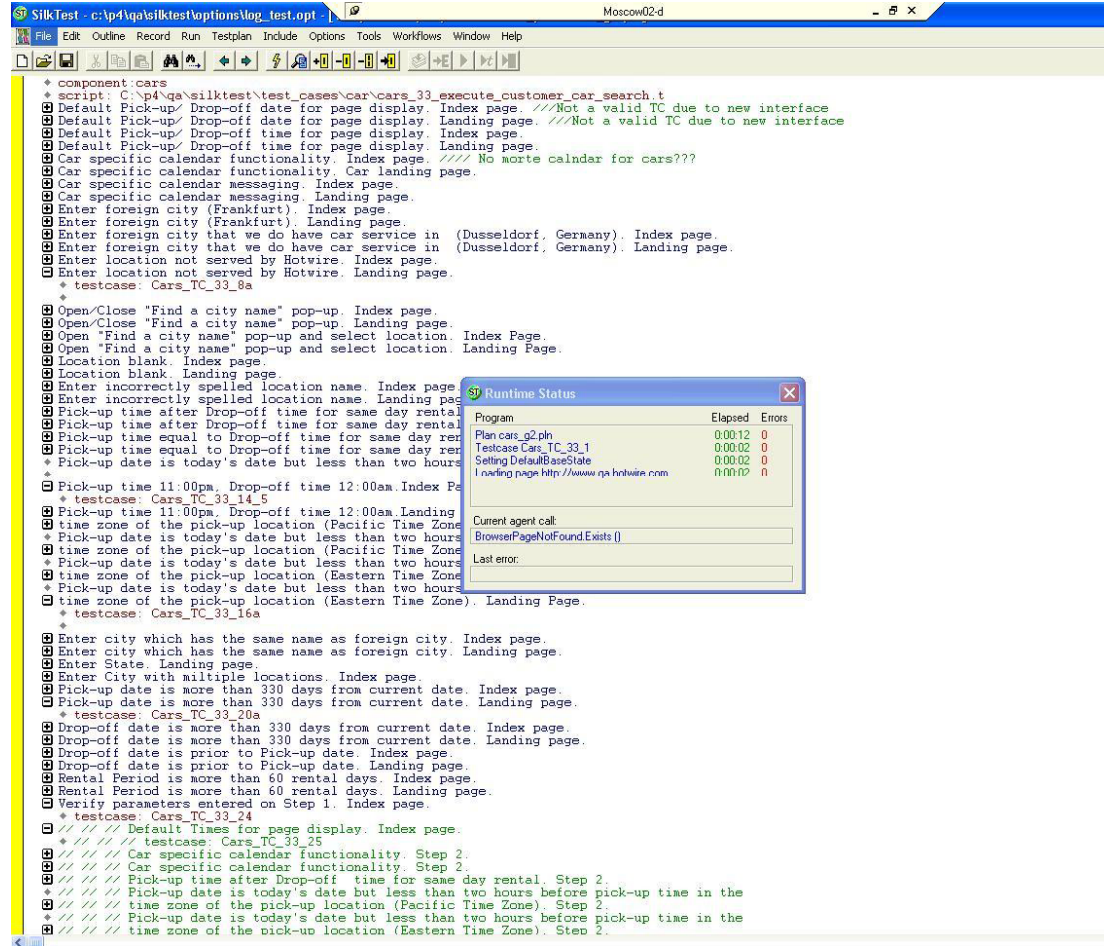


- Run all UT EACH time within build process
- Tools: Junit, NUnit, Clover, Ncover
- Write tests that exploit found bugs
- Sufficient code coverage: 75-85%
- Sufficient code coverage brings to significant development efforts (50-100%)
- Include UT in the scope of Code Review
- UT is the first part of automated tests. Second part is automated functional & international tests



Automated functional / integration tests

- Run all automated tests EACH time within build process
- Tools: IBM Rational Robot, Silk Test
- Required small efforts (evaluation tests for significant business functionality)
- Reduce testing time



The screenshot shows the SilkTest application window with a test log on the left and a Runtime Status window on the right. The test log contains a list of test cases and their results, including:

- component cars
- script: C:\p4\qa\silktest\test_cases\Car\cars_33_execute_customer_car_search.t
- Default Pick-up/ Drop-off date for page display. Index page. ///Not a valid TC due to new interface
- Default Pick-up/ Drop-off date for page display. Landing page. ///Not a valid TC due to new interface
- Default Pick-up/ Drop-off time for page display. Index page.
- Default Pick-up/ Drop-off time for page display. Landing page.
- Car specific calendar functionality. Index page. /// No worke calndar for cars???
- Car specific calendar functionality. Car landing page.
- Car specific calendar messaging. Index page.
- Car specific calendar messaging. Landing page.
- Enter foreign city (Frankfurt). Index page.
- Enter foreign city (Frankfurt). Landing page.
- Enter foreign city that we do have car service in (Dusseldorf, Germany). Index page.
- Enter foreign city that we do have car service in (Dusseldorf, Germany). Landing page.
- Enter location not served by Hotwire. Index page.
- Enter location not served by Hotwire. Landing page.
- testcase: Cars_TC_33_8a
- Open/Close "Find a city name" pop-up. Index page.
- Open/Close "Find a city name" pop-up. Landing page.
- Open "Find a city name" pop-up and select location. Index Page.
- Open "Find a city name" pop-up and select location. Landing Page.
- Location blank. Index page.
- Location blank. Landing page.
- Enter incorrectly spelled location name. Index page.
- Enter incorrectly spelled location name. Landing page.
- Pick-up time after Drop-off time for same day rental
- Pick-up time after Drop-off time for same day rental
- Pick-up time equal to Drop-off time for same day rental
- Pick-up time equal to Drop-off time for same day rental
- Pick-up date is today's date but less than two hours
- Pick-up time 11:00pm, Drop-off time 12:00am. Index Page
- testcase: Cars_TC_33_14_5
- Pick-up time 11:00pm, Drop-off time 12:00am. Landing page
- time zone of the pick-up location (Pacific Time Zone)
- Pick-up date is today's date but less than two hours
- time zone of the pick-up location (Pacific Time Zone)
- Pick-up date is today's date but less than two hours
- time zone of the pick-up location (Eastern Time Zone)
- Pick-up date is today's date but less than two hours
- time zone of the pick-up location (Eastern Time Zone). Landing Page.
- testcase: Cars_TC_33_16a
- Enter city which has the same name as foreign city. Index page.
- Enter city which has the same name as foreign city. Landing page.
- Enter State. Landing page.
- Enter City with multiple locations. Index page.
- Pick-up date is more than 330 days from current date. Index page.
- Pick-up date is more than 330 days from current date. Landing page.
- testcase: Cars_TC_33_20a
- Drop-off date is more than 330 days from current date. Index page.
- Drop-off date is more than 330 days from current date. Landing page.
- Drop-off date is prior to Pick-up date. Index page.
- Drop-off date is prior to Pick-up date. Landing page.
- Rental Period is more than 60 rental days. Index page.
- Rental Period is more than 60 rental days. Landing page.
- Verify parameters entered on Step 1. Index page.
- testcase: Cars_TC_33_24
- Default Times for page display. Index page.
- testcase: Cars_TC_33_25
- Car specific calendar functionality. Step 2
- Car specific calendar functionality. Step 2
- Pick-up time after Drop-off time for same day rental. Step 2
- Pick-up date is today's date but less than two hours before pick-up time in the
- time zone of the pick-up location (Pacific Time Zone). Step 2
- Pick-up date is today's date but less than two hours before pick-up time in the
- time zone of the pick-up location (Eastern Time Zone). Step 2

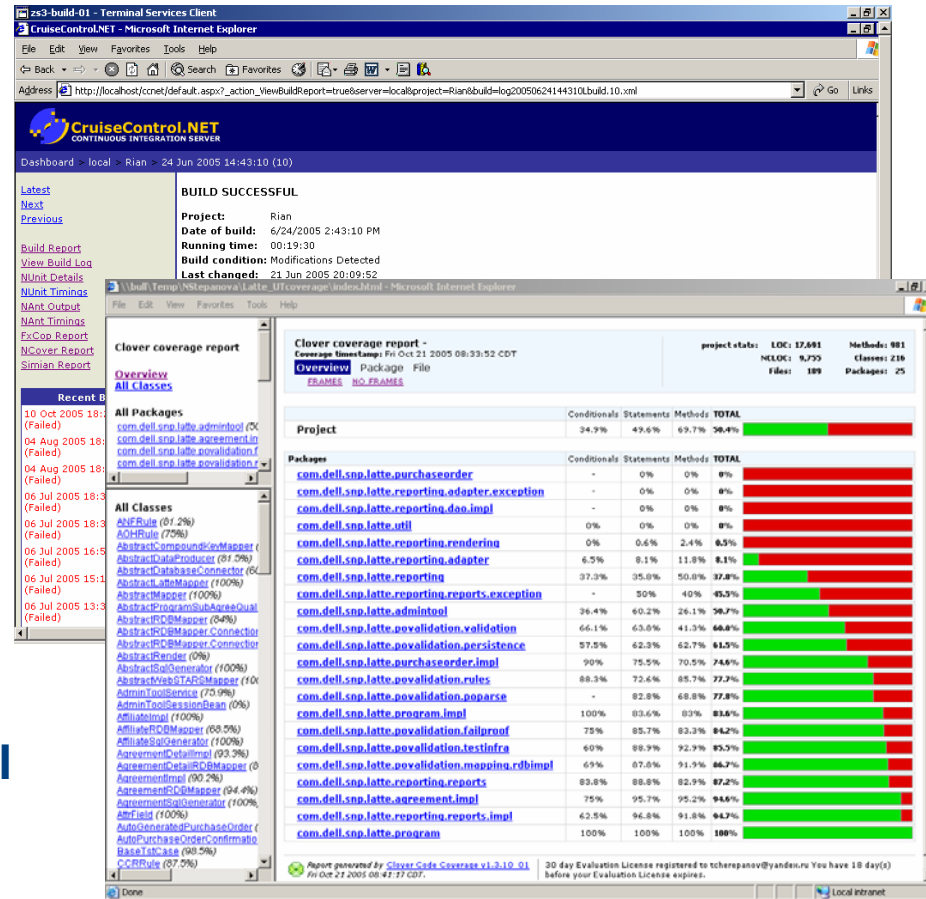
The Runtime Status window shows the following data:

Program	Elapsed	Errors
Plan cars_g2.pln	0:00:12	0
Testcase: Cars_TC_33_1	0:00:02	0
Setting DefaultBaseState	0:00:02	0
Loading page: http://www.na.hotwire.com	0:00:02	0

Additional fields in the Runtime Status window include: Current agent call, BrowserPageNotFound.Exists (), and Last error.

Continuous integration

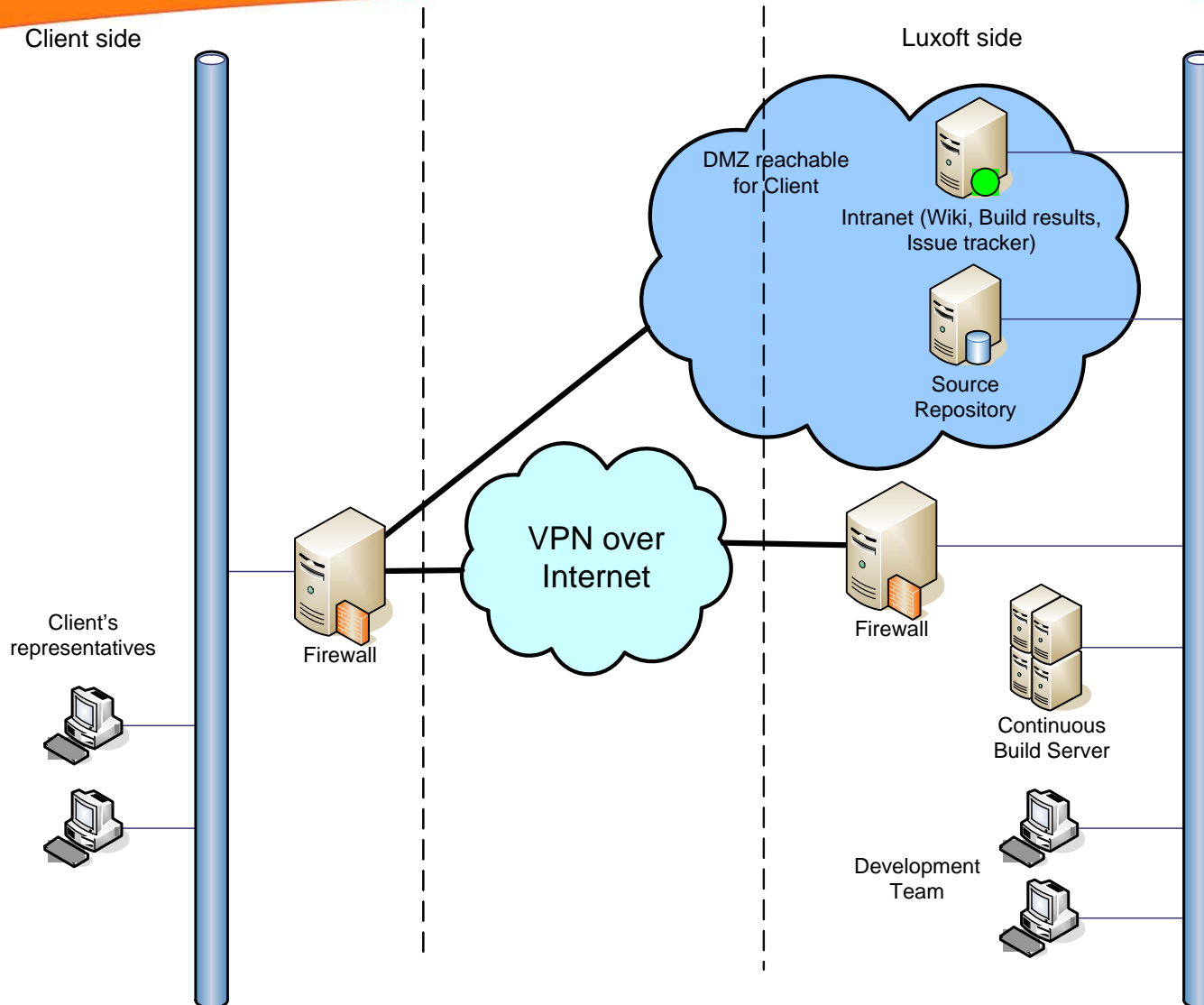
- Launch build process automatically each day
- System alerts developers about build results/problems (e-mail build failures to entire team, publish to Portal/Wiki/Version Control System)
- Always runs Unit Tests & Automated code review (Unit test failure can optionally be considered a build failure)
- Publish build scripts, instructions, guidelines, etc. on corporate portal (Continuous integration infrastructure should be setting up at the beginning of the project)



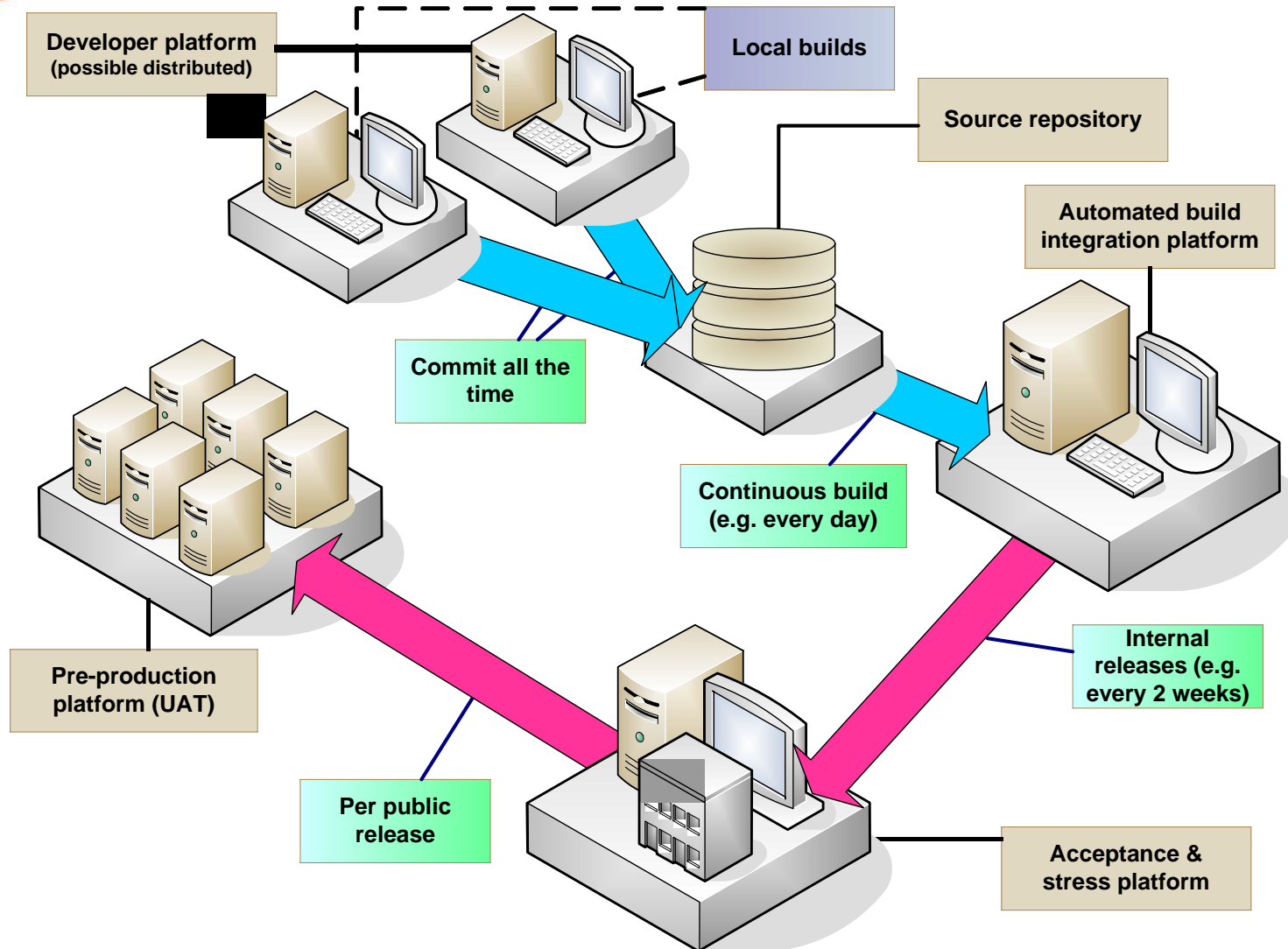
The screenshot displays the CruiseControl.NET web interface. The top section shows a "BUILD SUCCESSFUL" message for project "Rian" on 6/24/2005 at 2:43:10 PM. Below this, a "Clover coverage report" is shown, detailing coverage for various packages and classes. The report includes a table with columns for Project, Packages, Conditionals, Statements, Methods, and TOTAL, with corresponding progress bars for each row.

Project	Conditionals	Statements	Methods	TOTAL
com.dell.snp.latte.purchaseorder	0%	0%	0%	0%
com.dell.snp.latte.reporting.adapter.exception	0%	0%	0%	0%
com.dell.snp.latte.reporting.dao.impl	0%	0%	0%	0%
com.dell.snp.latte.util	0%	0%	0%	0%
com.dell.snp.latte.reporting.rendering	0%	0.6%	2.4%	0.5%
com.dell.snp.latte.reporting.adapter	6.5%	8.1%	11.8%	8.1%
com.dell.snp.latte.reporting	37.3%	35.0%	50.8%	37.8%
com.dell.snp.latte.reporting.reports.exception	-	50%	40%	45.3%
com.dell.snp.latte.admintool	36.4%	60.2%	26.1%	59.7%
com.dell.snp.latte.validation.validation	66.1%	63.0%	41.5%	66.8%
com.dell.snp.latte.validation.persistence	57.5%	62.3%	62.7%	61.5%
com.dell.snp.latte.purchaseorder.impl	90%	75.5%	70.5%	74.6%
com.dell.snp.latte.validation.rules	88.3%	72.4%	85.7%	77.7%
com.dell.snp.latte.validation.parsers	-	82.8%	68.8%	77.8%
com.dell.snp.latte.program.impl	100%	83.6%	83%	84.6%
com.dell.snp.latte.validation.failproof	75%	85.7%	82.3%	84.2%
com.dell.snp.latte.validation.testinfra	60%	89.9%	92.9%	85.3%
com.dell.snp.latte.validation.mapping.rdbimpl	69%	87.0%	91.9%	86.7%
com.dell.snp.latte.reporting.reports	83.8%	88.8%	82.9%	87.2%
com.dell.snp.latte.agreement.impl	75%	95.7%	95.2%	94.6%
com.dell.snp.latte.reporting.reports.impl	42.5%	94.8%	91.8%	94.3%
com.dell.snp.latte.program	100%	100%	100%	100%

Project Infrastructure



Continuous builds & platforms



Active Software Engineering Quality



- **Goal: share quality concepts through build automation**
- **Contrasts with Documentation-driven quality**
 - Automated
 - Preventive instead of curative
- **Benefits:**
 - In time delivery
 - Low defect density
 - High productivity
- **Requires trained coaches and evangelization**
 - Need to develop culture of excellence
- **Continuous integration requires a Build manager/engineer (full time job)**

- **Code Review**
 - Java: CheckStyle (<http://checkstyle.sourceforge.net>), PMD (<http://pmd.sourceforge.net>), CDP (<http://pmd.sourceforge.net/cpd.html>)
 - .NET: FxCop (<http://www.gotdotnet.com/team/fxcop>), DevPartner (<http://www.compuware.com/products/devpartner/default.htm>)
- **Unit Testing**
 - Java: JUnit (<http://www.junit.org>)
 - .NET: NUnit (<http://www.nunit.org>)
 - Coverage: Clover (<http://www.cenqua.com/clover>), Ncover (<http://ncover.sourceforge.net>)
- **Automated functional/integration tests**
 - SilkTest (<http://www.borland.com/us/products/silk/silktest/index.html>)
 - Rational Robot (<http://www.ibm.com/ru/software/rational/testing/robot.html>)
- **Continuous Integration**
 - CruiseControl (<http://cruisecontrol.sourceforge.net>)
 - Ant (<http://ant.apache.org>)
 - NAnt (<http://nant.sourceforge.net>)
- **Presentation**
 - Wiki: MediaWiki (<http://www.mediawiki.org/wiki/Download>), Confluence (<http://www.atlassian.com/software/confluence>)
 - MS SharePoint (<http://www.microsoft.com/rus/sharepoint/default.mspix>)

Questions



Thank you!