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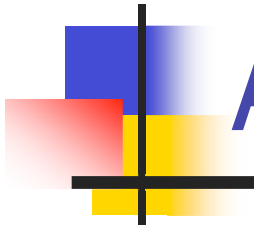

Real Life Automated Tests – A Case Study

Dan Bergh Johnsson

Omegapoint AB, Sweden

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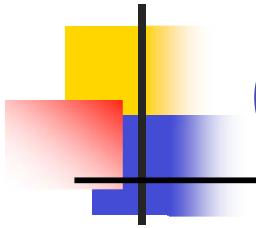

Code Examples

- Download from:
  - http://www.omegapoint.se/public/css2005

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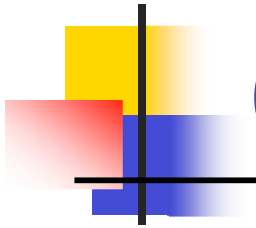

Outline

- Chronology of project
  - Out-spelled ambition on automated tests
- Our ideas
- How we realised them
- Techniques we used
- Problems we ran into
- Insights we gained

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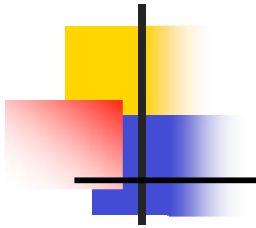

Disclaimer

- Not the perfect project
  - Ordinary people doing their best
  - Like your own
- Not admire our cleverness
  - Learn from our mistakes
- Description not perfect
  - I was not there all the time
  - No annals kept

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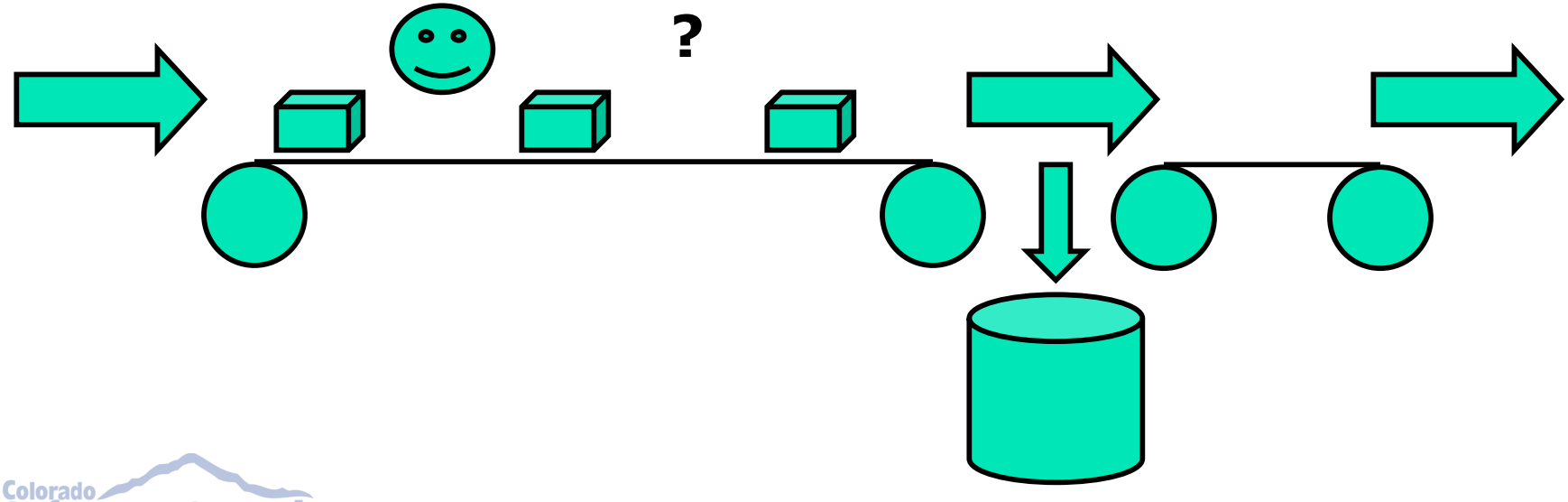
Architectural Overview

- Import of basic data for decision-making
- Manual processing (quick feedback)
- Automatic cross-checks, filtering and manual approve
- Generation of decision report
- History saved



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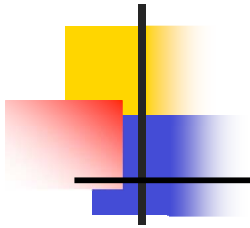

Processing Tech-stack

- Fast feedback
- Distributed clients
- Long-running business transaction

- JavaScript
- JSP
- Struts
- Process Session EJB
- xdoclet Value Objects
- Data Session EJB
- Data Entity EJB
- Middlegen
- Database

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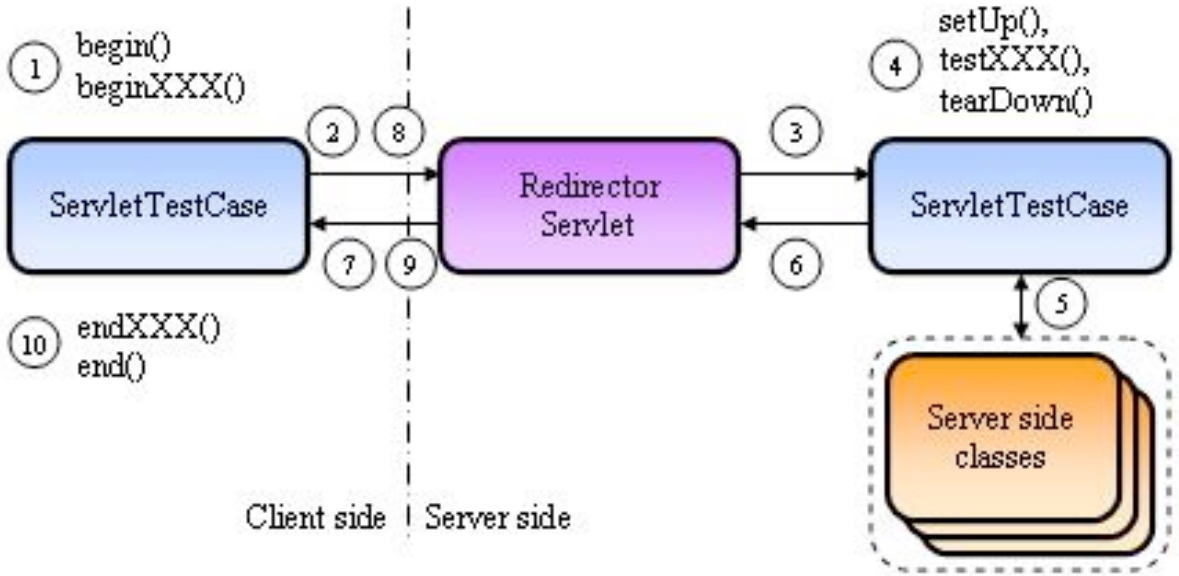
Idea: Automated Tests

- JUnit not enough
- Cactus
- In-container

[http://jakarta.apache.org/cactus/how_it_works.html]



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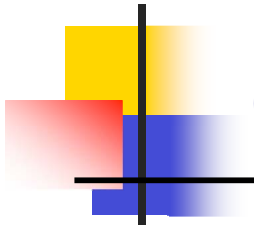

Cactus

- DEMO

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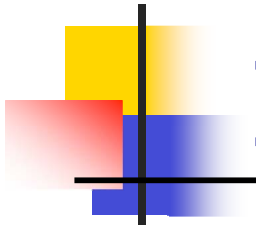

Idea: Well Known DB-state

- DBUnit
- [http://dbunit.sourceforge.net/]
- Each table an xml-file w table data
- Load on setUp
- Delete-all on tearDown
- Each test isolated

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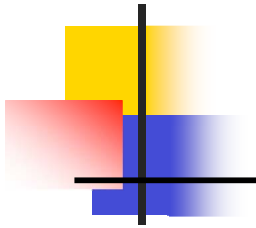

DBUnit

- DEMO

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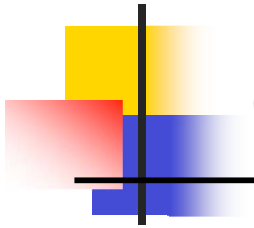

Cactus + DBUnit

- DBUnit: "Simulated import"
  - Created DB and exported as xml
- Cactus: drive of BL

- How it worked out:
  - Good start
  - Problem maintaining DBUnit data
  - Fix set of imports not very flexible

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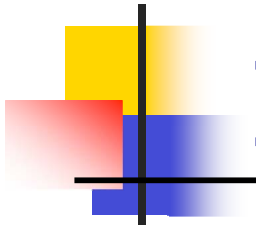

Idea: Nightly Build

- SourceSafe "Get Latest"
- Complete rebuild
- All JUnit TestCase
- Deploy
- Restart JBoss
- Run Cactus(DBUnit)
- (Other jobs: checkstyle, jdepend, *etc*.)
- Generate build portal

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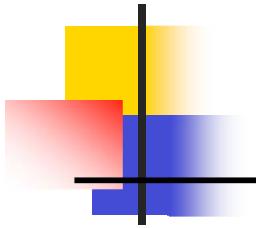

How It Worked Out

- Need to be watched
- Feedback for programmers
- Focus on one feature at a time
  - Choose your fights

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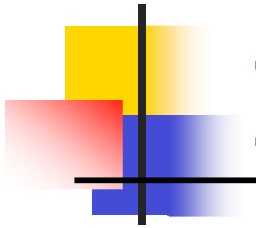

Idea: Code Coverage

- Clover
- Instrumentation compiled into code
- DEMO

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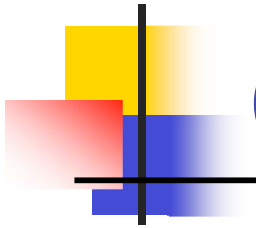

Clover Issues

- Clover on or off
- Trouble when recompiling some
- Slower

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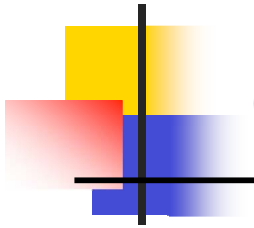

Clover Evaluation

- Slow
  - Not for local testing
  - OK for build server
- Coverage is not quality
- Limited value on cactus tests
  - Too coarse-grained
  - Touches too much code
- Good for unit tests

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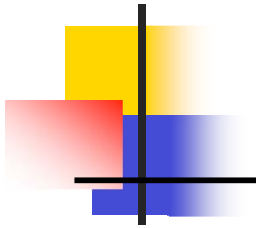

Problem: Failing Cactus Tests

- Some "external integration" tests
- External system also under development
- Intermediary fails
- Undermining test morale

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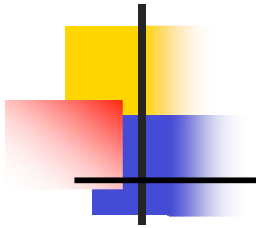

Lesson Learned

- All tests independent of other systems
- Try
  - Mock away connection
  - Provide local fake install
  - Do not test

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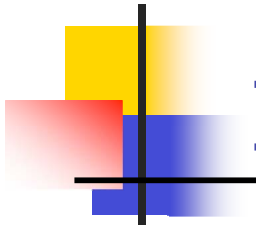

Insight: Web-tier Needs Attention

- Much focus on business logic
- Web-tier not much attention
- Grown into a hair-ball
- Tech: StrutsTestCase
  - CactusStrutsTestCase on top of Cactus
- DEMO

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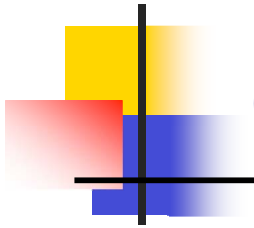

CactusStrutsTestCase: Issues

- Really awkward to test
- Lot of setup to drive one user interaction
- Cumbersome to drive long interactions
  - Several requests
- Too high threshold – end up not done

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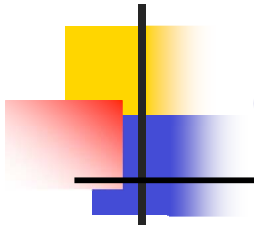

CactusStrutsTestCase: Eval

- Unit tests
  - Too heavy
- User story tests
  - OK
  - Need flexible way to set up test data
  - Need util methods for forms

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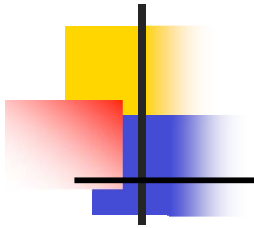

Problem: Degrading Test-suite

- Causes:
  - Intermediary failures
  - Long test-suite
  - High pressure on development
  - New features higher priority than stabilising

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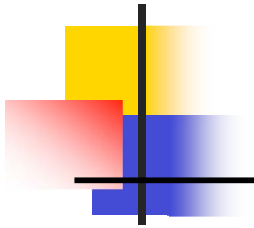

Insight: All Tests Are Not the Same

- Failing JUnit unit tests not OK
  - No excuse for not running
- Failing Cactus tests can be OK
  - System under redesign

- Lesson Learned

  Real difference:
  - Unit tests *vs* functionality/integration tests

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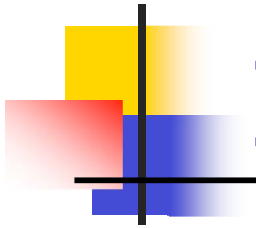

Insight: Coverage Analysis

- Code coverage not one percentage
  - Methods
  - Statements
  - Conditionals
- Balance interesting
  - Method/Statements ~ 60 %
  - Conditionals < 50%
- Testing "Happy Path"
  - OK for integration tests
  - Not OK for unit tests

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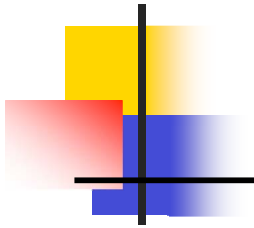

Problem: Web Still Badly Tested

- CactusStrutsTestCase
  - Slow
  - Cumbersome
- Solution: Mocked container!
- MockStrutsTestCase
  - Out-of container
- Need to mock Service Layer
  - DynaMock/MockObjects

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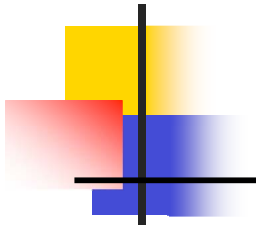

MockStrutsTestCase

- DEMO

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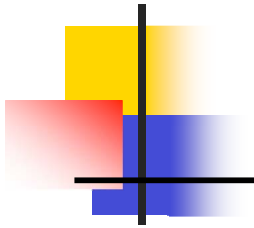

Problem: Meagher Test Data

- DBUnit data contain limited variation
- Hard to reproduce defects
- "One test for each defect" undermined
- Lesson Learned
  - Need flexible way to setup testdata
  - XML-files are not the way
  - DBUnit OK for "background" data

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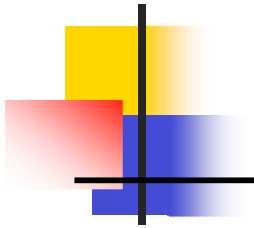

Insight: "Static Mocking"

- Blinded by DynaMock
- What is wrong with static mocking?
- XyzInterface
  - AbstractXyzMock – common
    - Uncallable method implementations
  - XyzMock – specific per test
    - Override methods intended to be called
- Works well in refactor-aware IDE

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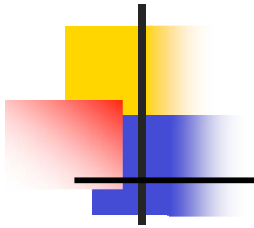

Problem: Hard to Test Web

- State in hidden-fields, attributes, *etc*.
- Stop trying to test "as is"
- Redesign for testability

- First step
  - Collect in HttpState
- Refined to PresentationState
- Can be tested

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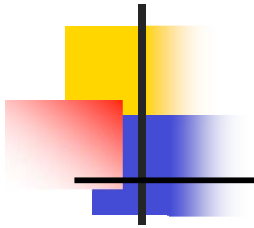

Problem: Incomplete DBUnit Data

- Structural changes
- New tables and columns
- DBUnit data still in old structure

- Solution:
  - attempt to complement it
  - Load to DB – run migration scripts – export again
  - Tool tips: DbVisualizer
    - 5.0 with direct xml-export

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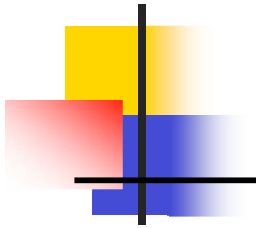

Lesson Learned

- Test data from day 1
- Migration script for every iteration
  - Also for versions before first release
  - Need routine in place for second release
- Update test data with insights
  - Will break old test
  - Worth it

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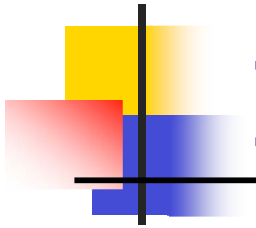

Idea: Faster CI

- Build server
  - Luntbuild (or CruiseControl or Anthill or …)
  - CVS polling
  - Clean rebuild, deploy, testsuite, email report
- Lost coverage history

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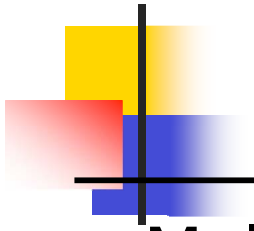

Problem: Branches

- Multiple branches
  - One in PROD
  - One in TEST
  - One in HEAD
- Build-server with one JBoss
  - Fix in TEST
  - Patch to HEAD
  - Automatic build collision
- Possible Future Solutions
  - Several JBoss instances
  - Deploy under different names on same instance

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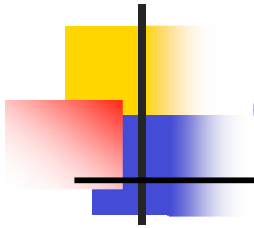

Insight: Unit Tests Hidden in Cactus

- Some Cactus tests tested function "inside" component
- Move test to directly test the component
- Cactus test => JUnit TestCase

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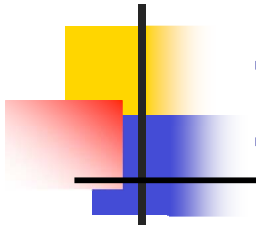

Idea: "Testability Tests"

- Regression testing of functionality
- Make automatic
- Need:
  - Way to feed "import" data
  - Way to drive functions

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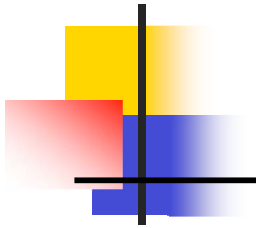

Feeding of Import Data

- Very complex data
- Domain Specific Language
- Fix-field format
- Directly defined by test group

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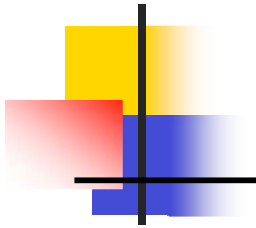

Drive of Functions

- Have Cactus tests of BL
- Hard to do HTML/JavaScript level
- Action "batch mode"
- On Struts Action
  - Or directly beneath

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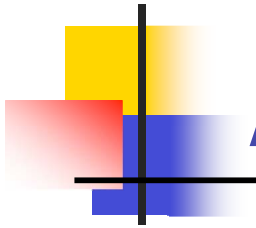

Agenda Right Now

- Multiple branches
- Flexible import test data
  - DSL
- Convert "Cactus unit tests" to JUnit

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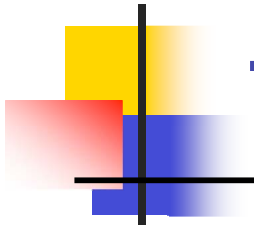

To Be Continued…

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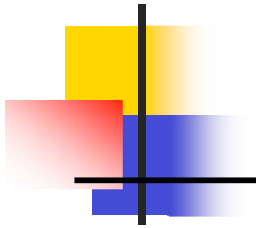

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- StrutsTestCase [http://strutstestcase.sourceforge.net/]
- DynaMock/MockObjects [http://www.mockobjects.com/DynaMock.html]

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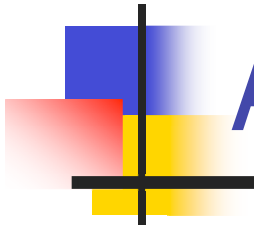

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