

# Table-driven Requirements with the FIT Testing Tool



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## Acceptance Test Driven Requirements

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## Net Objectives: Who We Are

|                  |  |
|------------------|--|
| <b>Mission</b>   | Assisting companies to maximize the return of their investment in software development. The goal is for companies to increase their ability to respond to changing business needs while improving the efficiencies of their development teams. |
| <b>Services</b>  | Assessments and consulting to help create the proper structure for the organization. Training and coaching in Lean, Agile, Scrum, Patterns, Test-Driven Development to manifest the plan.  |
| <b>Expertise</b> | Enterprise Technology Delivery<br>Lean Software Development<br>Agile Methods (Scrum, XP, RUP)<br>Product Management<br>Agile Analysis<br>Design Patterns<br>Test-Driven Development / Quality Assurance  |

## Table-driven Requirements with the FIT Testing Tool

### Resources

- Lean Software Development
- Agile / Scrum
- Design / Testing / Programming Skills for Agile Developers
- Agile VSTS
- Certification
- Coaching
- Tools
- Webinars
- Bibliography by Topic
- Book: Design Patterns Explained
- Book: Emergent Design
- Book: Prefactoring
- Book: Lean-Agile Software Development - Achieving Enterprise Agility
- Book: Lean-Agile Pocket Guide for Scrum Teams
- Book: Essential Skills for the Agile Developer
- Podcast: Lean-Agile Straight Talk
- Blog: Net Objectives Thoughts
- Pattern Repository
- User Groups

- Resources: [www.netobjectives.com/resources](http://www.netobjectives.com/resources)
  - Webinars/Training Videos (PowerPoint with audio)
  - Articles and whitepapers
  - Pre/post course support Supporting materials
  - Quizzes
  - Recommended reading paths
- Blogs and podcasts: [blogs.netobjectives.com](http://blogs.netobjectives.com)
- Annotated Bibliography
- After-Course Support (students only)
- Additional Training
- Two User Groups
  - <http://tech.groups.yahoo.com/group/leanagile>
  - <http://tech.groups.yahoo.com/group/leanprogramming>

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### Objectives

- Acceptance test driven development can help customer /developer communication
- Table-driven requirements can reduce ambiguity over free text
- Tables can be the tests
- Requirements are tests / tests are requirements
  - What are your requirements (tests) for this session?

# Table-driven Requirements with the FIT Testing Tool

## Ken Pugh



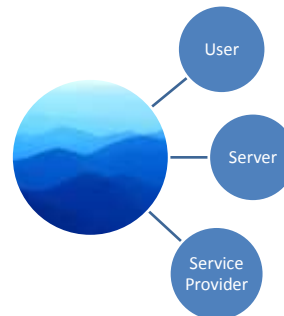
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- Fellow Consultant
- OOA&D, Design Patterns, Lean, Agile, Scrum, Test-Driven Development
- Author *Prefactoring*, 2006 Jolt Award Winner
- Author *Interface Oriented Design*
- Over 1/3 century of software development experience

*No code goes in till the test goes on.  
A journey of two thousand miles begins with a single step.*

## Acceptance Tests

- Acceptance Tests:
  - User's point of view
  - External view of system
- Examine externally visible effects
  - Inputs and outputs
  - State changes
  - External interfaces



# Table-driven Requirements with the FIT Testing Tool

## Types of Tests



- User Acceptance
  - Provided by end user / customer
  - May be just “happy path” or obvious scenarios
- Completeness
  - All exceptional conditions
  - Complete End-To-End

## Acceptance Tests As Tables



- Functional tables
  - Business logic
  - Workflow
- Quality metric tables
  - Performance
  - Scalability
- Tables can show
  - Rules themselves
  - Examples of rules

## Table-driven Requirements with the FIT Testing Tool

### Tables



- Tables can be executed with
  - FIT/FITNESS
  - Automation tool (e.g. QTP)
  - Other
- Discovery
  - Filling out tables may bring to light suppressed premises
    - *Unstated requirements or assumptions*

### Types of tests



- Given this input, is the output this value?
- When user does this, does the state change to that new state?
- When this event occurs, does the appropriate action occur?

## Table-driven Requirements with the FIT Testing Tool

### Types of Answers



- Idempotent – same answer all the time
- State dependent
- Time dependent
- Highly data dependent

### Table Evaluation



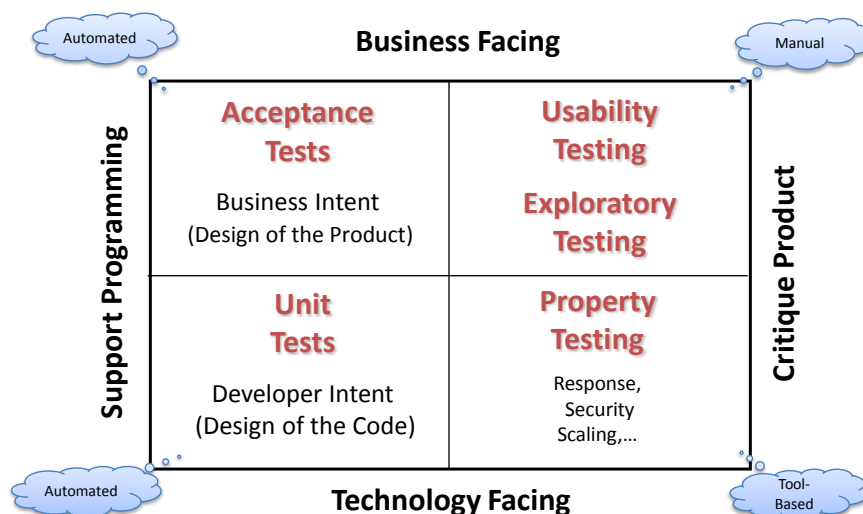
- Remove redundant redundancy
- Business domain terms
- Specific, easy to diagnose
- Avoid lots of input and output columns
  - Break into smaller tables
- Shared between customer unit and developer unit
- Automatable (part of continuous build)

## Table-driven Requirements with the FIT Testing Tool

### Warning

- Acceptance tests and tables are not a substitute for interactive communication
- They can provide focus for that communication.

### Types of Testing



## Table-driven Requirements with the FIT Testing Tool



### Input / Output Example

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#### Input and Output Example

- Demonstrate
  - Dependence on Input Values
  - Limits on Input Values
- Input Temperature in Celsius, Output Temperature in Fahrenheit
- Dependence question:
  - $0\text{ C} \rightarrow 32\text{ F}$
  - $100\text{ C} \rightarrow 212\text{ F}$
- Limit questions:
  - $-253.16\text{ C} \rightarrow -459.4\text{ F}$  (absolute zero  $0\text{ K}$ )
  - $-253.161\text{ C} \rightarrow$  What should it do?



## Table-driven Requirements with the FIT Testing Tool

### Input and Output Example (continued)

| Celsius  | Fahrenheit | Notes             |
|----------|------------|-------------------|
| 0        | 32         |                   |
| 100      | 212        | Needed?           |
| -253.16  | -459.4     | Precision?        |
| -253.161 | Error      | Below 0 Kelvin    |
| 500      | 932        | Maximum – Needed? |

### Conversion Example

- As an accountant, I need to convert a set of amounts that are in different currencies to a total in a common currency
- Answers are time dependent
  - Exchange rates
  - How often exchange rates updated

## Table-driven Requirements with the FIT Testing Tool

### Currency Conversion Table

| Currency To/<br>Currency From | EUR | USD  | SWF |
|-------------------------------|-----|------|-----|
| EUR                           | 1.0 | 1.51 | .91 |
| USD                           | .67 | 1.0  | .75 |
| SWF                           | 1.1 | 1.35 | 1.0 |

| Input                  | Convert To<br>Currency | Converted Amount |
|------------------------|------------------------|------------------|
| 5 EUR                  | USD                    | 7.55 USD         |
| 7.55 USD               | EUR                    | 5.06 EUR ??      |
| 5 EUR + 10 USD         | USD                    | 17.55 USD        |
| 5 EUR + 10 USD         | EUR                    | 11.70 EUR        |
| 5.01 EUR + 5.01 EUR    | USD                    | 15.13 USD ??     |
| 5.01 EUR + 5.01 SWF    | USD                    | 14.32 USD ??     |
| 5 EUR + 10 USD + 5 SWF | USD                    | 24.30 USD        |

### Table Drives Questions

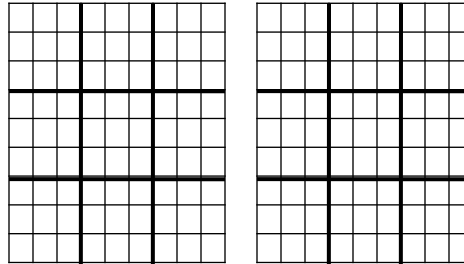
- Questions
  - What to do with “round-off”?
    - Example: Tax program income/expense not match balance sheet
  - Are the conversions symmetric
    - e.g.  $USD \rightarrow EUR == 1 / (EUR \rightarrow USD)$
  - Should amounts be individually converted
    - or should amounts in currency be totaled before conversion?

## Table-driven Requirements with the FIT Testing Tool

### Sudoku



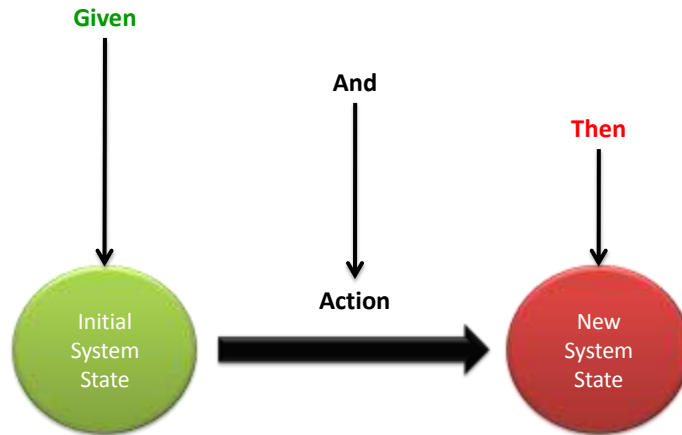
- Sudoku
  - Input Table
  - Output Table
- Tables for
  - Is there only one Output?
  - Is there no Output?
  - How much time does it take to achieve an output?



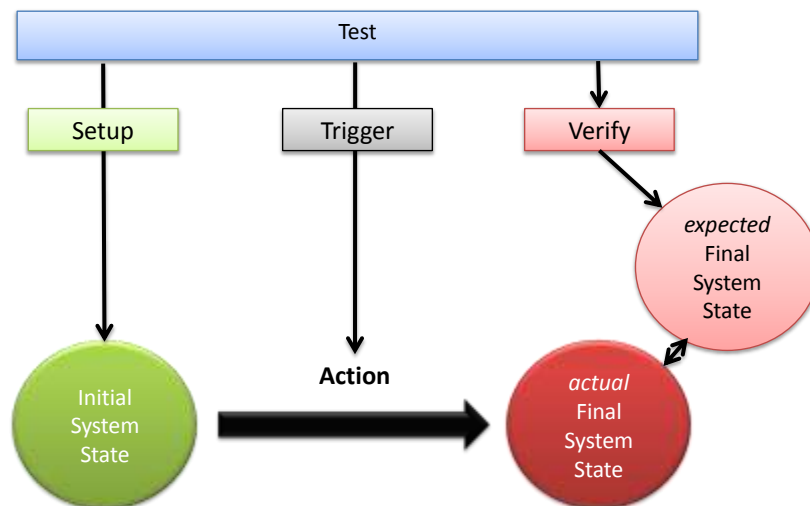
## Test Anatomy

# Table-driven Requirements with the FIT Testing Tool

## State Changes



## Testing State Changes

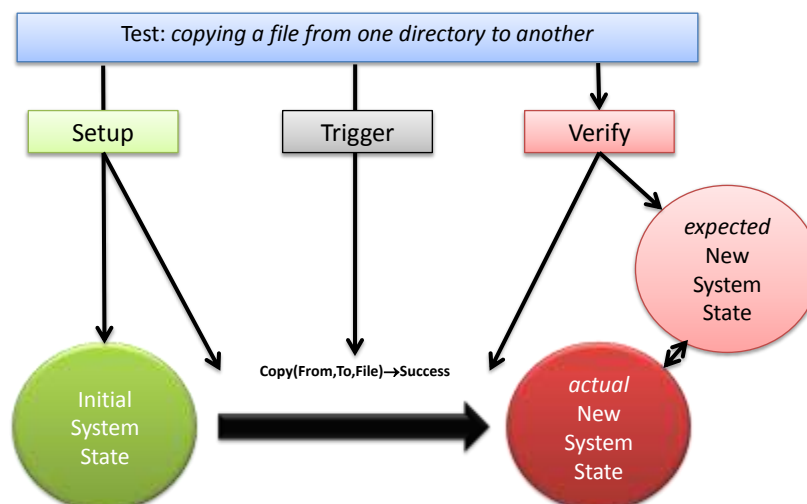


## Table-driven Requirements with the FIT Testing Tool

### Exercise

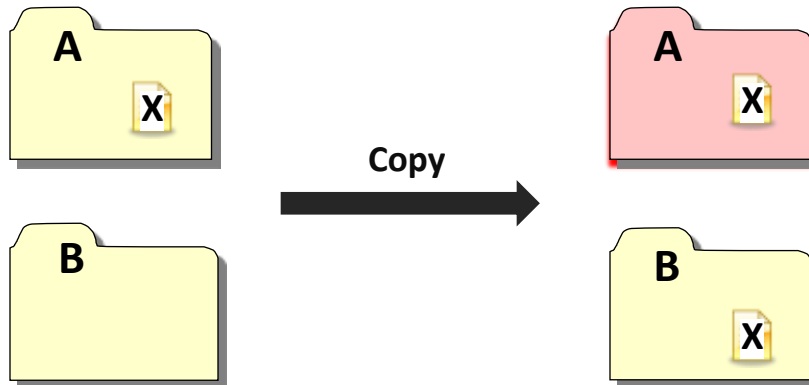
- Write questions (tests) for:  
“*copying a file from one directory to another*”

### Initial State and Copy Parameters

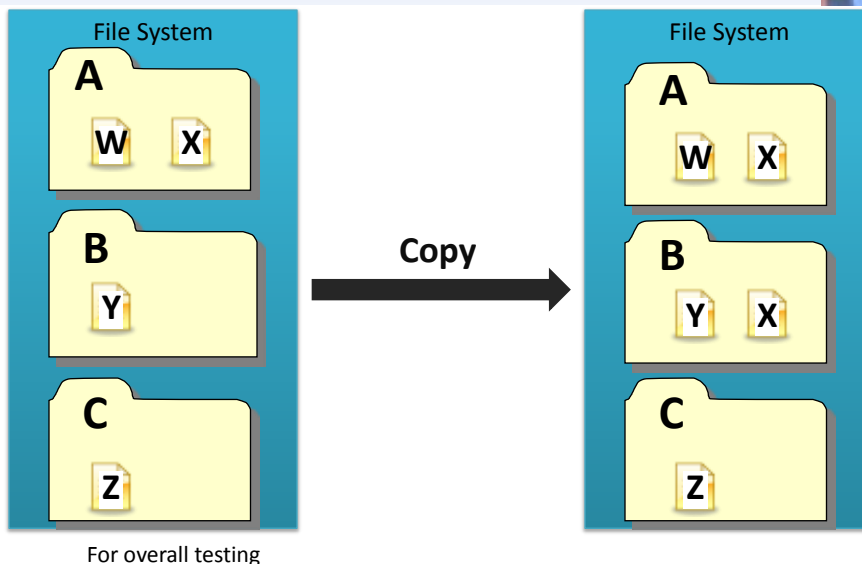


# Table-driven Requirements with the FIT Testing Tool

## Analysis Scenario



## Complete Scenario



## Table-driven Requirements with the FIT Testing Tool

### Copying Table Example

| Source Directory Contains | Destination Directory Contains | Copy File | Destination Directory Contains? | Content Comparison?              | Notes             |
|---------------------------|--------------------------------|-----------|---------------------------------|----------------------------------|-------------------|
| X, Y, Z                   | A, B, C                        | X         | A,B,C,X                         | (Destination.X == Source.X)      | Standard copy     |
| X, Y, Z                   | A,B,C,X                        | X         | A,B,C,X                         | (Destination.X == Source.X)      | X overwritten     |
| X, Y, Z                   | A,B,C,X                        | X         | A,B,C,X                         | (Destination.X == Destination.X) | X not overwritten |

What about modification date and other attributes?  
Make more columns



## First Example

## Table-driven Requirements with the FIT Testing Tool

### A Business Rule Example

If Customer Rating is Good and the Order Total is less than or equal \$10.00,

Then do not give a discount,

Otherwise give a 1% discount.

If Customer Rating is Excellent,

Then give a discount of 1% for any order.

If the Order Total is greater than \$50.00,

Then give a discount of 5%.

### Business Rule Table

| Discount    |                 |                      |
|-------------|-----------------|----------------------|
| Order total | Customer rating | Discount percentage? |
| 10.00       | Good            | 0.0                  |
| 10.01       | Good            | 1.0                  |
| 50.01       | Good            | 1.0                  |
| .01         | Excellent       | 1.0                  |
| 50.00       | Excellent       | 1.0                  |
| 50.01       | Excellent       | 5.0                  |



## Table-driven Requirements with the FIT Testing Tool

### Business Rule Table - Rearranged

Table may be rearranged if easier to read/maintain

| Discount    |                 |                      | Notes                 |
|-------------|-----------------|----------------------|-----------------------|
| Order total | Customer rating | Discount percentage? |                       |
| 10.00       | Good            | 0.0                  |                       |
| 10.01       | Good            | 1.0                  |                       |
| .01         | Excellent       | 1.0                  | Minimum order         |
| 50.00       | Excellent       | 1.0                  |                       |
| 50.01       | Excellent       | 5.0                  |                       |
| 50.01       | Good            | 1.0                  | Compared to Excellent |

### A Little Code

```
class Discount extends fit.ColumnFixture
{
    // Names must match column heads (sans spacing)
    public double orderTotal;
    public CustomerRating customerRating;
    public double discountPercentage()
    {
        return computeDiscount(orderTotal, customerRating);
    }
}
```

## Table-driven Requirements with the FIT Testing Tool

### Business Rule Table

|             |                 |                         |
|-------------|-----------------|-------------------------|
| Discount    |                 |                         |
| Order total | Customer rating | Discount percentage?    |
| 10.00       | Good            | 0.0                     |
| 10.01       | Good            | 1.0                     |
| 50.01       | Good            | Expected 1.0 Actual 5.0 |
| .01         | Excellent       | 1.0                     |
| 50.00       | Excellent       | 1.0                     |
| 50.01       | Excellent       | 5.0                     |

### Business Rule Table With Formatting

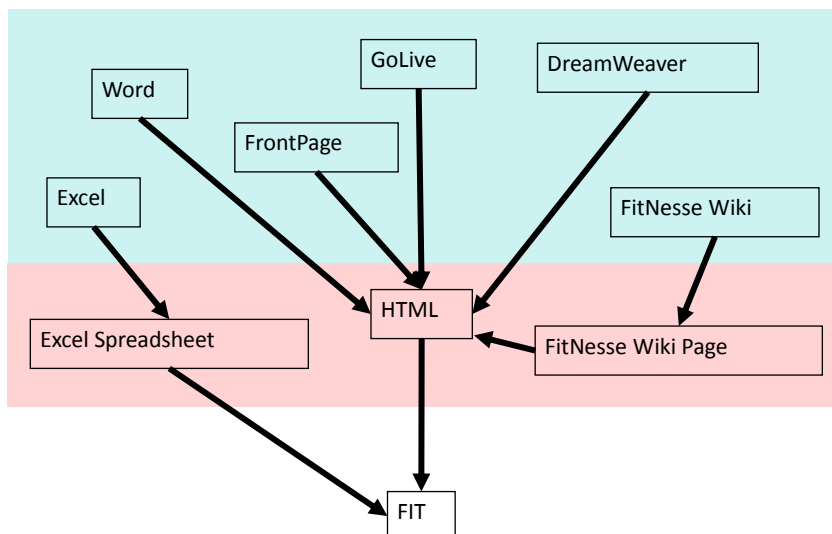
|             |                 |                      |
|-------------|-----------------|----------------------|
| Order total | Customer rating | Discount percentage? |
| \$10.00     | Good            | 0.0%                 |
| \$10.01     | Good            | 1.0%                 |
| \$50.01     | Good            | 1.0%                 |
| \$.01       | Excellent       | 1.0%                 |
| \$10.00     | Excellent       | 1.0%                 |
| \$50.01     | Excellent       | 5.0%                 |

## Table-driven Requirements with the FIT Testing Tool

### A Little Different Code

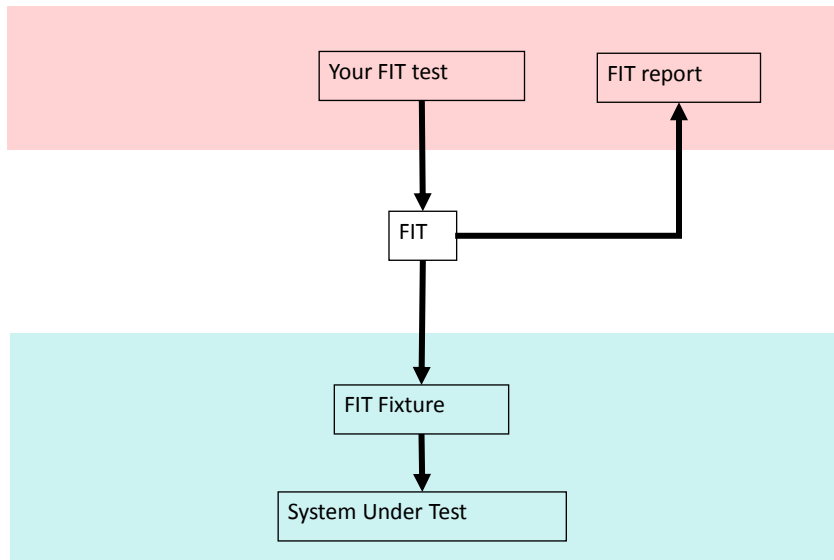
```
class Discount extends fit.ColumnFixture {
    public Dollar orderTotal;
    public CustomerRating customerRating;
    public Percentage discountPercentage()
    {
        // Calls the method that computes
        // the discount and returns the discount
        return computeDiscount
            (orderTotal, customerRating);
    }
};
```

### Tools for Writing a FIT Test



# Table-driven Requirements with the FIT Testing Tool

## What FIT does to Your Tests



## fit.RowFixture

- Data
- Shows missing/extras as failures
- Example: Renting a CD

| CurrentlyRented |            |          |
|-----------------|------------|----------|
| CDID            | CustomerID | Due      |
| 12              | 2          | 1/1/2009 |
| 6               | 3          | 1/2/2009 |
| 20              | 6          | 1/3/2009 |

# Table-driven Requirements with the FIT Testing Tool

## fit.ActionFixture

- Sequence of events
- Simple scripting
- Imperative
- Start begins sequence; enter sets values; press executes action; check tests values

| ActionFixture |                 |     |
|---------------|-----------------|-----|
| <b>start</b>  | <b>checkout</b> |     |
| enter         | CDID            | 12  |
| enter         | CustomerID      | 2   |
| press         | submit          | 1   |
| check         | dueindays       | 2   |
| check         | amountdue       | \$2 |

## Combined Test

| CurrentlyRented |                   |            |
|-----------------|-------------------|------------|
| <b>CDID</b>     | <b>CustomerID</b> | <b>Due</b> |
| 12              | 2                 | 1/1/2009   |

| Date        |             |
|-------------|-------------|
| <b>Date</b> | <b>Set?</b> |
| 1/1/2009    |             |

| Rental       |                 |   |
|--------------|-----------------|---|
| <b>start</b> | <b>checkout</b> |   |
| enter        | CDID            | 6 |
| enter        | CustomerID      | 3 |
| press        | submit          |   |

| CurrentlyRented |                   |            |
|-----------------|-------------------|------------|
| <b>CDID</b>     | <b>CustomerID</b> | <b>Due</b> |
| 12              | 2                 | 1/1/2009   |
| 6               | 3                 | 1/3/2009   |

# Table-driven Requirements with the FIT Testing Tool

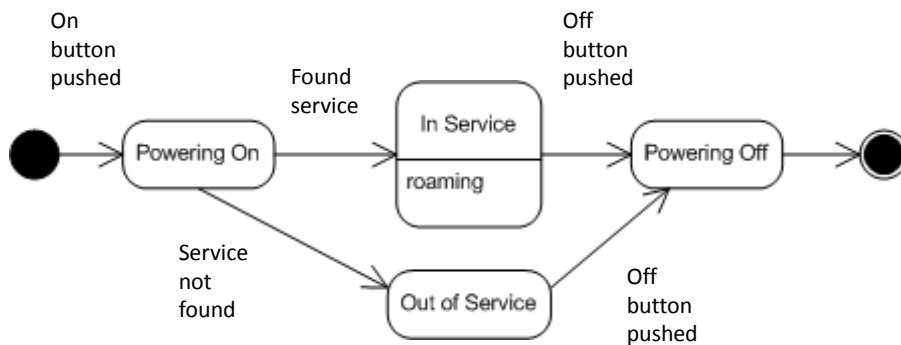


## Example Of State

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### State Diagram

#### ■ Cell Phone



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## Table-driven Requirements with the FIT Testing Tool

### State Table

| State/Event    | On Button Pushed | Service Found | Service Not Found | Off Button Pushed |
|----------------|------------------|---------------|-------------------|-------------------|
| Initial        | Powering On      |               |                   |                   |
| Powering On    |                  | In Service    | Out of Service    |                   |
| In Service     |                  |               |                   | Powering Off      |
| Out of Service |                  |               |                   | Powering Off      |

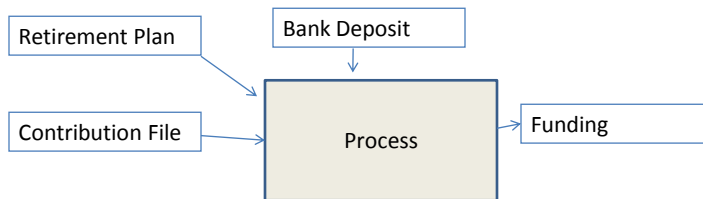


## Example Contributions

# Table-driven Requirements with the FIT Testing Tool

## Retirement Contribution Example

- Requirement  
The system shall match incoming retirement contribution files with bank deposits. If the total on the contribution files matches the bank deposit, the corresponding funds shall be purchased.
- Exceptions ?



## Setup Tables

|              |                  |
|--------------|------------------|
| PlanID = XYZ |                  |
| Name         | Fund             |
| George       | WildEyedStocks   |
| Sam          | GovernmentBonds  |
| Bill         | UnderTheMattress |

| PlanID | Bank Routing Number | Account Number |
|--------|---------------------|----------------|
| XYZ    | 111-11-11111        | 12345678       |



# Table-driven Requirements with the FIT Testing Tool

## Inputs

|                    |            |
|--------------------|------------|
| 401K Contributions | PlanID=XYZ |
| Name               | Amount     |
| George             | 5000       |
| Sam                | 1000       |
| Bill               | 500        |

|                |                |        |
|----------------|----------------|--------|
| Bank Deposit   |                |        |
| Routing Number | Account Number | Amount |
| 111-11-11111   | 12345678       | 6500   |

## Output Table

|                 |                  |        |
|-----------------|------------------|--------|
| Expected Output |                  |        |
| Funding         | PlanID = XYZ     |        |
| Name            | Fund             | Amount |
| George          | WildEyedStocks   | 5000   |
| Sam             | GovernmentBonds  | 1000   |
| Bill            | UnderTheMattress | 500    |

## Table-driven Requirements with the FIT Testing Tool

### Alternative Inputs – Off By a Dollar

|                    |            |
|--------------------|------------|
| 401K Contributions | PlanID=XYZ |
| Name               | Amount     |
| George             | 5000       |
| Sam                | 1000       |
| Bill               | 500        |

|                |                |        |
|----------------|----------------|--------|
| Bank Deposit   |                |        |
| Routing Number | Account Number | Amount |
| 111-11-11111   | 12345678       | 6501   |

### Contribution States

| Contribution State         | Meaning                              |
|----------------------------|--------------------------------------|
| Received                   | Contribution File received           |
| Awaiting Match             | Waiting for Bank Deposit             |
| Purchase Funds             | Matched Bank Deposit, buy funds      |
| Begin Exception Processing | Bank Deposit received, but incorrect |

## Table-driven Requirements with the FIT Testing Tool

### State Transitions

| Contribution State | Event                            | New State                | Notes                                     |
|--------------------|----------------------------------|--------------------------|---|
| Initial            | Received data                    | Received                 |   |
| Received           | Data check is bad                | EditProcessing           |   |
| Received           | Data check is good               | Awaiting Match           |   |
| Awaiting Match     | Matched exactly                  | Purchase Funds           | Matching on entry and ½ hour before close |
| Awaiting Match     | Discrepancy in match             | BeginExceptionProcessing |   |
| AwaitingMatch      | Matching time exceeded           | BeginExceptionProcessing |   |
| Purchase Funds     | One minute prior to market close | Awaiting Confirmation    | Enter order for funds                     |

### Deposit States

| Deposit State  | Event              | New State       |
|----------------|--------------------|-----------------|
| Initial        | Data received      | Received        |
| Received       | Data check is bad  | Edit Processing |
| Received       | Data check is good | Awaiting Match  |
| Awaiting Match | MatchedExactly     | Matched         |

## Table-driven Requirements with the FIT Testing Tool



### Example Email

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#### Email Address Validation

- Requirement
  - Reject invalid email addresses
  - Improperly formed ones
  - Ones from “anonymous sites”

# Table-driven Requirements with the FIT Testing Tool

## Original Table

| Email                           | Valid | Reason         |
|---------------------------------|-------|----------------|
| <u>George@sam.com</u>           | Y     |                |
| George@george@same.com          | N     | Two @          |
| <u>George@hotmail.com</u>       | N     | Banned domain  |
| <u>George@iamoutogetyou.com</u> | N     | Banned domain  |
| .George@sam.com                 | N     | Invalid name   |
| George@samcom                   | N     | Invalid domain |
| George+Bill@sam.com             | Y     |                |
| ... and many more               |       |                |

## Format Validation

| Email    | Valid? | Name? | Domain? |
|----------|--------|-------|---------|
| X@Y      | Y      | X     | Y       |
| XY       | N      | DNC   | DNC     |
| XY@XY@XY | N      | DNC   | DNC     |

## Table-driven Requirements with the FIT Testing Tool

### Name Validation

- The Name (actually the local-part) must only contain:
  - Uppercase and lowercase English letters (a-z, A-Z)
  - Digits 0 through 9
  - Period (.) provided that it is not the first nor last character, nor may it appear two or more times consecutively.
  - Characters ! # \$ % & ' \* + - / = ? ^ \_ ` { | } ~
- Maximum size is 64 characters

### Name Valid Characters

| Characters                             | Valid                                     |
|--|---|
| a-z                                    | Y   |
| A-Z                                    | Y   |
| 0-9                                    | Y   |
| ! # \$ % & ' * + - / = ? ^ _ ` {   } ~ | Y   |
| .                                      | Y (if not first, last or two consecutive) |
| Anything else (maybe list)             | N   |

## Table-driven Requirements with the FIT Testing Tool

### Valid Name Examples

| Name      | Valid? | Reason                        |
|-----------|--------|-------------------------------|
| George    | Y      |                               |
| George..a | N      | Period appears twice in a row |
| George^   | N      | Character not allowed         |
| .George   | N      | Period first                  |
| George.   | N      | Period last                   |

### Domain Validation

- Domains
  - Maximum 255 characters
  - Periods separate parts of domain
  - There must be at least a top level domain and a second level domain

## Table-driven Requirements with the FIT Testing Tool

### Domain Character Validation

| Character     | Valid | Notes   |
|---------------|-------|---|
| a-z           | Y     |   |
| .             | Y     | Must have at least one<br>Cannot be first or last character |
| -             | Y     |   |
| 0-9           | Y     |   |
| Anything else | N     |   |

### Domain Validation

| Domain  | Top Level Domain | Second Level Domain | Third Level Domain | Valid | Notes                         |
|---------|------------------|---------------------|--------------------|-------|-------------------------------|
| A.B.C   | C                | B                   | A                  | Y     |                               |
| Z       |                  |                     |                    | N     | Must have at least one period |
| B.C     | C                | B                   |                    | Y     |                               |
| A.B.C.D | D                | C                   | B                  | Y     | Fourth Level is A             |
| Z.      |                  |                     |                    | N     | Cannot end in period          |
| .Z      |                  |                     |                    |       | Cannot begin with period      |



## Table-driven Requirements with the FIT Testing Tool

### Disallowed Domain

| Domain            | Reason         |
|-------------------|----------------|
| Hotmail.com       | Anonymous mail |
| Imouttogetyou.com | Spam source    |
| More ??           |                |



### Example Separate Event From Response

## Table-driven Requirements with the FIT Testing Tool

### Event

| Username | Password | Result?            | Notes               |
|----------|----------|--------------------|---------------------|
| Sam      | 123      | Bad Password       | 1 <sup>st</sup> bad |
| George   | 1123     | No user            | 2 <sup>nd</sup> bad |
| Sam      | 1234     | Bad Password       | 3 <sup>rd</sup> bad |
| Same     | 12345    | Security Violation | 4 <sup>th</sup> bad |

| Event              | Action                 |
|--------------------|------------------------|
| Bad Password       | Display "password bad" |
| No user            | Display "no user"      |
| Security violation | Send enforcement team  |



## Example Complex Business Rule

# Table-driven Requirements with the FIT Testing Tool

## Complex Business Rule

| Field One          | Field Two     | Field Three        | Field Four | Result   |
|--------------------|---------------|--------------------|------------|----------|
| > 20               | < 50 or blank | >=100              | Y          | Allow    |
| Otherwise or blank | DNC           | DNC                | DNC        | Disallow |
| DNC                | Otherwise     | DNC                | DNC        | Disallow |
| DNC                | DNC           | Otherwise or blank | DNC        | Disallow |
| DNC                | DNC           | DNC                | N or blank | Disallow |

## Complex Business Rule

| Field One | Result   |
|-----------|----------|
| > 20      | Allow    |
| Blank     | Disallow |
| Otherwise | Disallow |

| Field Three | Result   |
|-------------|----------|
| >=100       | Allow    |
| Blank       | Disallow |
| Otherwise   | Disallow |

| Field Two | Results  |
|-----------|----------|
| < 50      | Allow    |
| Blank     | Allow    |
| Otherwise | Disallow |

| Field Four | Result   |
|------------|----------|
| Y          | Allow    |
| N          | Disallow |
| Blank      | Disallow |
| Otherwise  | ??       |

## Table-driven Requirements with the FIT Testing Tool

### Complex Business Rule

| Field One | Field Two | Field Three | Field Four | Result ? |
|-----------|-----------|-------------|------------|----------|
| Allow     | Allow     | Allow       | Allow      | Allow    |
| Disallow  | DNC       | DNC         | DNC        | Disallow |
| DNC       | Disallow  | DNC         | DNC        | Disallow |
| DNC       | DNC       | Disallow    | DNC        | Disallow |
| DNC       | DNC       | DNC         | Disallow   | Disallow |

### Business Rule And UI

- Two business rule results
  - Allow
  - Disallow
- Alternate UI manifestations of the business rule
  - Disable the button if disallowed
  - Hide the button if disallowed.
  - Display dialog box if disallowed and they push the button
- To cut down testing, expose business rule test for automation
  - 5 + 2 tests, rather than 5 \* 2 tests

## Table-driven Requirements with the FIT Testing Tool

### Separate UI From Business Rule

| Business Rule Result | UI Display?    | Notes                     |
|----------------------|----------------|---------------------------|
| Disallow             | Disable Button |                           |
| Allow                | Enable Button  | Take to some entry screen |

End-to-end test  
Third column may be redundant

| Sample database ID | Business Rule Result | UI Display?    |
|--------------------|----------------------|----------------|
| 10345              | Allow                | Disable Button |
| 5555               | Disallow             | Enable Button  |



## Example High Availability

## Table-driven Requirements with the FIT Testing Tool

### High Availability System

- If a server goes down, switch any applications running on it to the alternative server. If the alternate server does not have the capacity for all the applications, then run the applications based on priority order. Then email or text message the system administrator, based on his or her preference, that a server has gone down and some applications cannot be run.

### Servers and Applications

| ServerName | Capacity - Application |
|------------|------------------------|
| Freddy     | 5                      |
| Fannie     | 3                      |

| Application           | Priority |
|-----------------------|----------|
| CEO's Pet             | 100      |
| MP3 Download          | 99       |
| Lost Episode Watching | 98       |
| External Web          | 50       |
| Internal Web          | 25       |
| Payroll               | 10       |
|                       |          |

## Table-driven Requirements with the FIT Testing Tool

### Events Handling

|        |  |
|--------|--|
| Server | Applications                                   |
| Freddy | CEO's Pet, External Web, Internal Web, Payroll |
| Fannie | Lost Episode Watching, MP3 Download            |

| Event            | Servers Remaining ? | Applications Running ?  | Action ?                       |
|------------------|---------------------|---|--------------------------------|
| Freddy Goes Down | Fannie              | CEO's Pet, Lost Episode Watching, MP3 Download                              | Send event alert "Freddy down" |
| Fannie Goes Down | Freddy              | CEO's Pet, Lost Episode Watching, MP3 Download, External Web, Internal Web, | Send event alert "Fannie down" |

May discover new concepts or principles

### Event Alerts

| Event Alert  | Text ID | Email    | Action?               |
|--------------|---------|----------|-----------------------|
| Email        | DNC     | Ab@e.com | Send mail to AB@e.com |
| Text Message | 123     | DNC      | Send text to 123      |

| Event Alert | Email    | Response             | Action?          |
|-------------|----------|----------------------|------------------|
| Email       | AB@e.com | Mail sent            | None             |
| Email       | AB@e.com | Mail not deliverable | Audible alarm??? |

## Table-driven Requirements with the FIT Testing Tool

### And Another Condition

|        |   |
|--------|---|
| Server | Applications                                      |
| Fannie | CEO's Pet, Lost Episode<br>Watching, MP3 Download |

| Event            | Servers Remaining | Action?                 |
|------------------|-------------------|-------------------------|
| Fannie Goes Down | None              | Send event alert "Help" |



**Not An Ending,  
But a Beginning**



## Table-driven Requirements with the FIT Testing Tool


### Objective Review

- Our objectives were:
  - Acceptance test driven development can help customer unit/developer unit communication
  - Table-driven requirements can reduce ambiguity
  - Requirements are tests / tests are requirement
- Did we meet your tests?
  - If not, what else needs to be done?



## Table-driven Requirements with the FIT Testing Tool

### Resources



- Resources: [www.netobjectives.com/resources](http://www.netobjectives.com/resources)
  - Webinars/Training Videos (PowerPoint with audio)
  - Articles and whitepapers
  - Pre/post course support Supporting materials
  - Quizzes
  - Recommended reading paths
- Blogs and podcasts: [blogs.netobjectives.com](http://blogs.netobjectives.com)
- Annotated Bibliography
- After-Course Support (students only)
- Additional Training
- Two User Groups
  - <http://tech.groups.yahoo.com/group/leanagile>
  - <http://tech.groups.yahoo.com/group/leanprogramming>

Join our e-mail list to receive regular updates and information about our resources and training of interest to you

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### Help Us Spread the Word of Lean



- Contact us if you want a free day of Lean Software Development at your site, shared with your community. Contact Alan Shalloway [alshall@netobjectives.com](mailto:alshall@netobjectives.com)

## Table-driven Requirements with the FIT Testing Tool

### A Short List of Books - Lean Related

- Womack & Jones: *Lean-Thinking*
- Mary & Tom Poppendieck
  - *Lean Software Development*
  - *Implementing Lean Software Development: From Concept to Cash*
- Jeff Liker: *The Toyota Way*
- Michael Kennedy: *Product Development in the Lean Enterprise*
- Taiichi Ohno: *Toyota Production System*
- Ronald Mascitelli: *Building a Project-Driven Enterprise: How to Slash Waste and Boost Profits Through Lean Project Management*
- Kennedy, Harmon, Minnock: *Ready, Set, Dominate: Implement Toyota's Set-based Learning for Developing Products and Nobody Can Catch You*



See <http://www.netobjectives.com/resources/bibliography> for a full bibliography

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### Lean Management and Other Relevant Books

- Peter Scholtes: *The Leader's Handbook: Making Things Happen, Getting Things Done*
- David Mann: *Creating A Lean Culture: Tools to Sustain Lean Conversions*
- William Bridges: *Managing Transitions*
- Weick & Sutcliffe: *Managing the Unexpected: Assuring High Performance in an Age of Complexity*
- Alexander: *The Timeless Way of Building*
- Shalloway, Beaver, Trott: *Lean-Agile Software Development*
- Shalloway & Trott: *Lean-Agile Pocket Guide for Scrum Teams*



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## Table-driven Requirements with the FIT Testing Tool

### A Short List of Books - Technical

- Mugridge & Cunningham: *Fit for Developing Software*
- Michael Feathers: *Working Effectively with Legacy Code*
- Shalloway & Trott: *Design Patterns Explained, A New Perspective on Object-Oriented Design*
- Bob Martin: *Agile Software Development: Principles, Patterns and Practices*
- Freeman, Freeman, Bates, Sierra: *Head First Design Patterns*
- Martin Fowler, *Refactoring: Improving the Design of Existing Code*
- Ken Pugh: *Prefactoring*
- Scott Bain: *Emergent Design: The Evolutionary Nature of Professional Software Development*



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### Upcoming Free Events

- Newport News, VA Free Event
  - The Hampton Roads Lean-Agile Open – June 22
- Bellevue, WA Lean-Agile Seminar Series 2009
  - Sustainable Test-Driven Development – July 1
  - Extending Scrum with Lean: Introducing Scrum# – July 23
  - Acceptance Test-Driven Development – August 20
  - Which Agile Process is Right for You? Choosing Between Scrum, Kanban and Scrumban – September 17
  - Synergies Between Patterns and TDD – October 15
  - Introduction to Lean Software Development – November 5
  - Transition Testing: Cornerstone of Database Agility – December 10

For more information, see [www.netobjectives.com/free-seminars](http://www.netobjectives.com/free-seminars)

Agile Opens are 12:30pm – 5:00pm  
Bellevue seminars are 6:00pm – 8:30pm

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# Table-driven Requirements with the FIT Testing Tool

## Net Objectives Services

### Training in Sustainable Product Development

Net Objectives offers the most comprehensive Lean-Agile training in the world. Our offerings include Lean, Agile Analysis, Scrum, Design Patterns, Test-Driven Development, and Lean-Agile Testing.

Our approach is a blend of principles and practices to provide a complete team and/or enterprise wide training solution.

### Certification Programs by Net Objectives

Net Objectives offers certification programs that provides a road-map of knowledge as well as resources to get there.

- Lean Scrum Master Certification
- Scrum Master Certification
- Product Owner Certification

Net Objectives is not affiliated with the Scrum Alliance

### Assessment Services

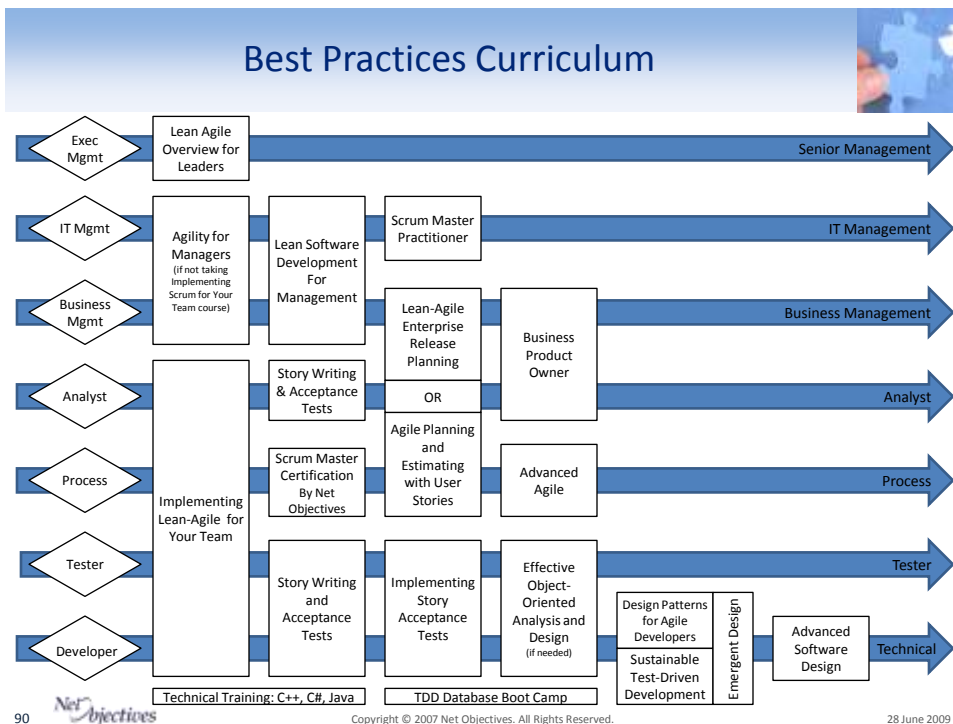
An effective way to embark on an enterprise level transition to Lean-Agile methods is to start with an assessment of where you are, where you want to go and options on how to get there that are right for you and your budget.

### Lean-Agile Coaching

While training provides foundational knowledge and is a great jump start, coaching is another effective way to increase the abilities of teams.

Our coaches work with your teams to provide guidance in both the direction your teams need to go and in how to get there.

Coaching provides the knowledge transfer while working on your own problem domain.

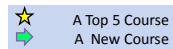


# Table-driven Requirements with the FIT Testing Tool

## Net Objectives Courses



- **Lean Software Development**
  - Lean Software Development for Management
  - ★ Lean Software Development
  - Lean-Agile Software Development
- **Agile/Scrum**
  - ★ Implementing Scrum for Your Team
  - Implementing Scrum for Multiple Teams
  - Lean Scrum Master Certification by Net Objectives
  - ★ Scrum Master Certification by Net Objectives
  - ★ Lean-Agile Enterprise Release Planning
  - Agile Planning and Estimating with User Stories
  - Agile Life-Cycle Management with VersionOne
  - Product Owner Certification by Net Objectives
  - Implementing Agile Development with Microsoft™ Visual Studio Team System™
- **Agile Software Development**
  - ★ Design Patterns Explained
  - Emergent Design: Effective Agile Software Development
  - Design Patterns for Agile Developers
  - ★ Sustainable Test-Driven Development
  - Story Writing and Acceptance Tests
  - Implementing Story Acceptance Tests
  - TDD Database Boot Camp
  - Advanced Software Design
  - Lean-Agile Testing Practices
  - Test-Driven ASP.NET
  - Effective Object-Oriented Analysis and Design



For more information, see: [www.netobjectives.com/training](http://www.netobjectives.com/training)