EM07

Software Quality for Enterprise Business Applications

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IBM Rational Software Development Conference 2008

WHERE TEAMS ARE R-HEROES

IBM

Rational. software

Agenda

- Introduction
- Automated Functional Testing
- Manual Functional Testing
- Automated Performance Testing
- Summary

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Introduction

- How can I test my Enterprise applications
  - *Some will stay terminal-based*
    - I need to test after each modification
  - *Some are migrating*
    - I need to test the new versus the old

I'd like to use single set of tools to test both type of application

The Tools

- IBM Rational Functional Tester (aka RFT)
  - Extension for Terminal Based Applications (FTE)
- IBM Rational Manual Tester (aka RMT)
- IBM Rational Performance Tester (aka RPT)
- IBM Worload Simulator (WSim)

Agenda

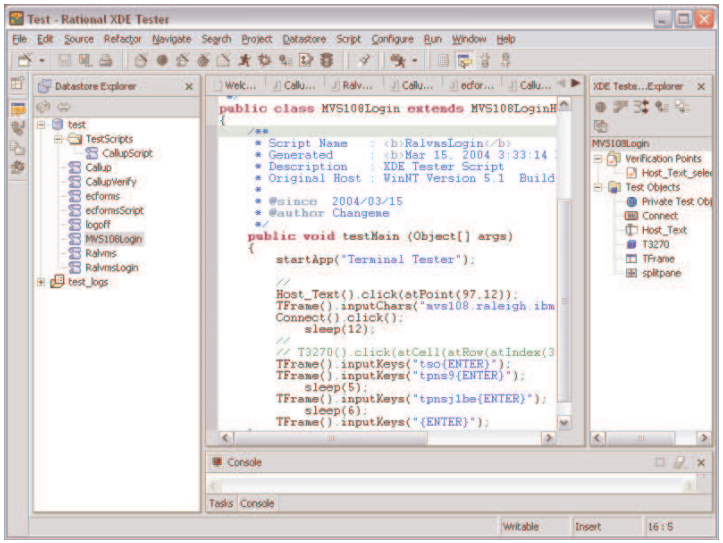
- Introduction
- **Automated Functional Testing**
- Manual Functional Testing
- Automated Performance Testing
- Summary

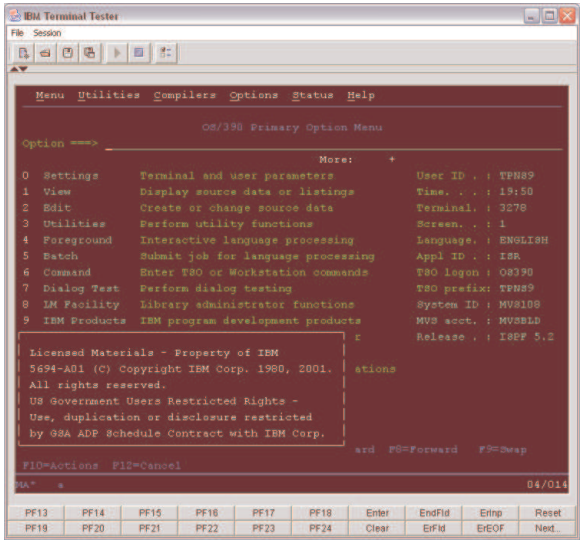
Functional Testing

- What is Functional Testing?
  - *Testing that ignores the internal mechanism of a system or component and focuses solely on the outputs generated in response to selected inputs and execution conditions. Synonym: black-box testing [IEEE 90].*
  - *Testing conducted from the users viewpoint.*
- In functional testing, we think of the program as a collection of functions
  - *We test it in terms of its inputs and outputs.*
- How can this be automated
  - *Rational Functional Tester*
  - *IBM Workload Simulator*

IBM Rational Functional Tester for Terminal-based Applications

IBM Rational Functional Tester Extension for Terminal based Applications *lets you test your System z and System i terminal based applications with the same tool – IBM Rational Functional Tester – used to test your Java, .NET and Web-based client server applications*





IBM Rational Functional Tester for Terminal-based Applications

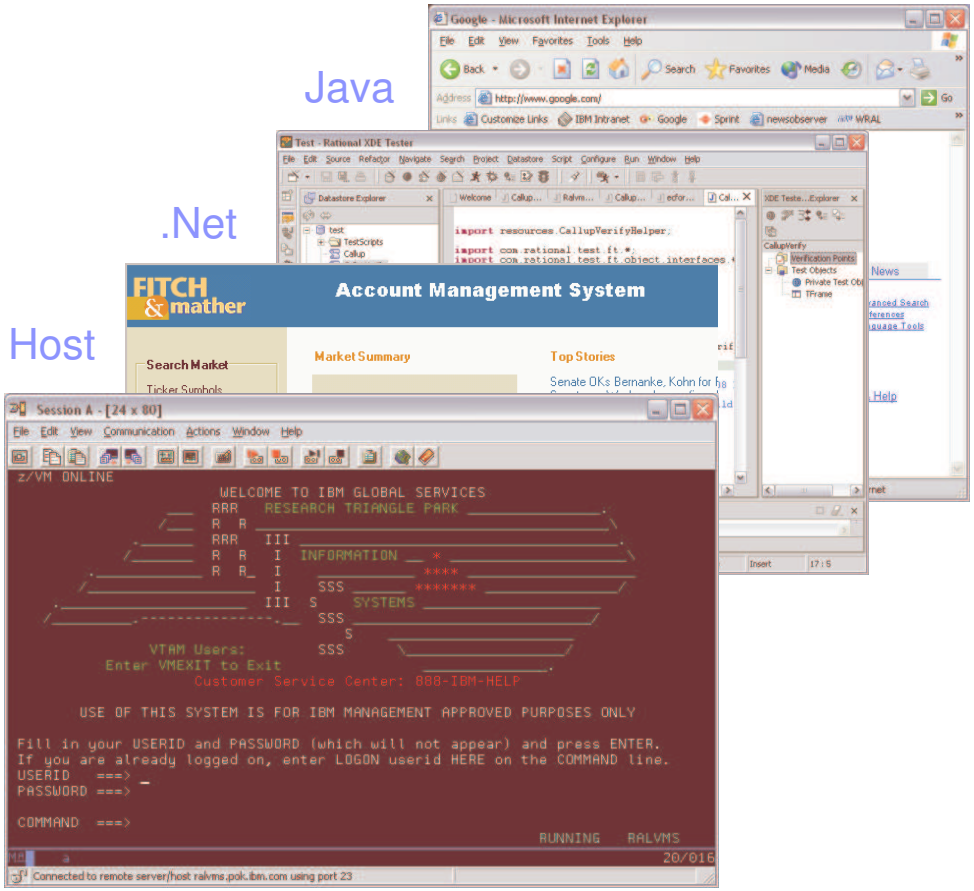
- Optional extension to Rational Functional Tester supports the testing of terminal-based applications.

  3270 (System z™)

  5250 (System i™)

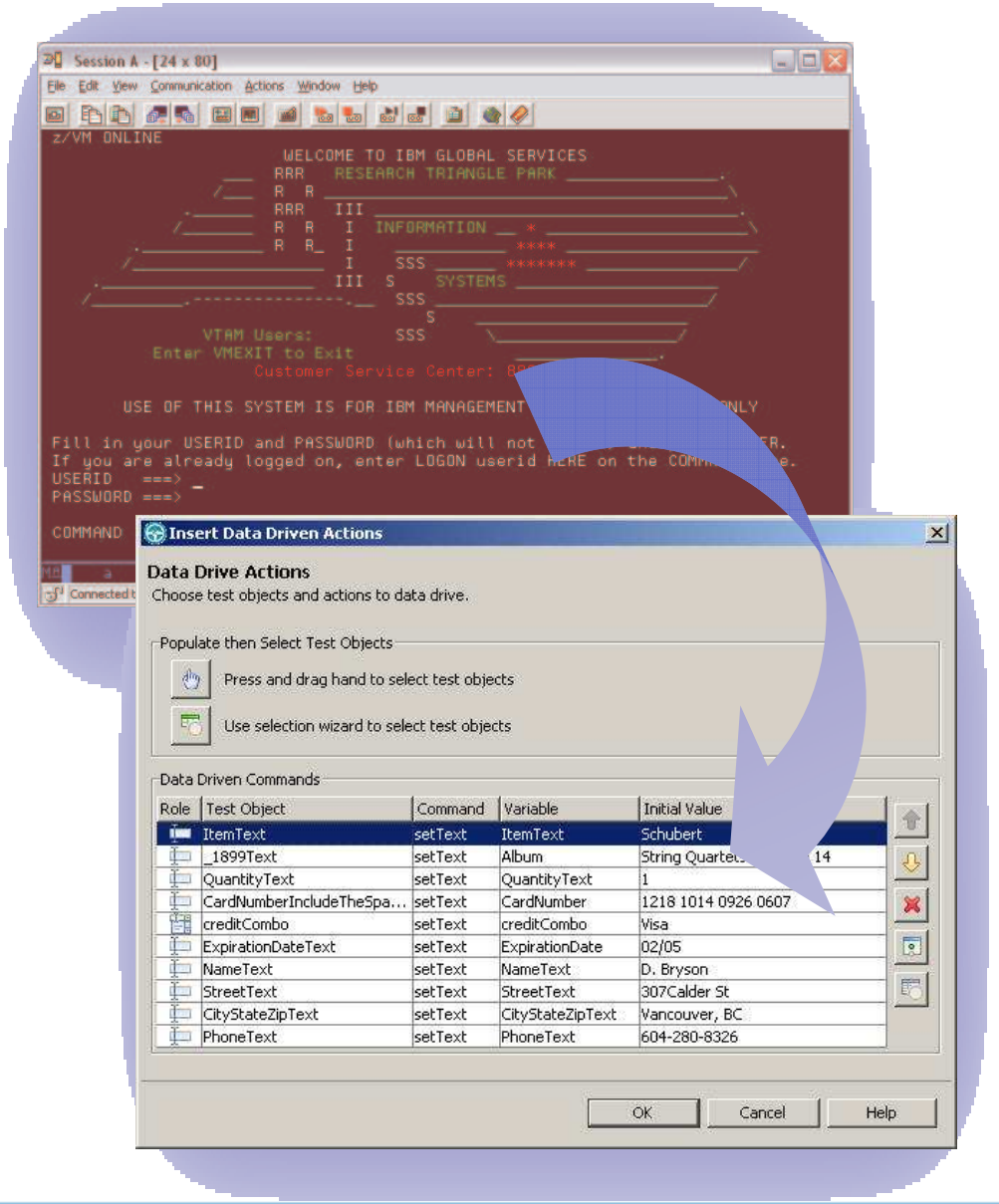
  VT100 (UNIX)

- Same tooling for automated testing solution for legacy ***and*** modernized apps



Recording Scripts

- **Data Driven Testing**
  - Separates test data from test script
  - Enables a single script to run multiple tests by using multiple data sets
- **Wizard driven process**
  - No programming involved
  - Import data from external sources

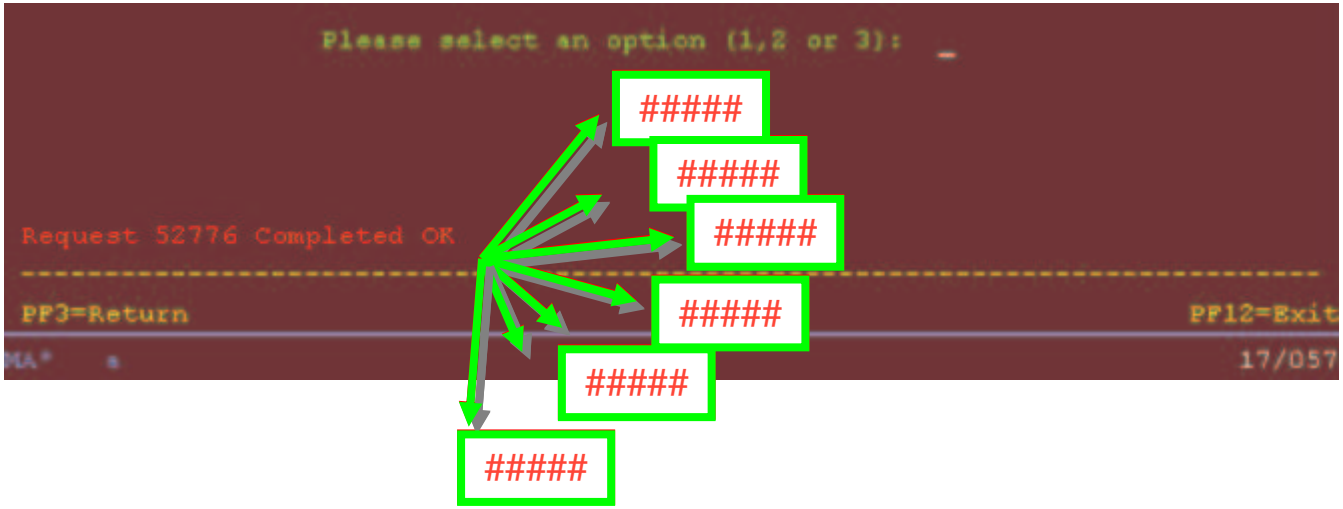


Investigate Your Terminal-based Application

- **Automated Validation**
  - Verify any message or data on the screen
  - Verify any field attribute properties – including ones you can't see yourself

Validating Dynamic Data Without Coding

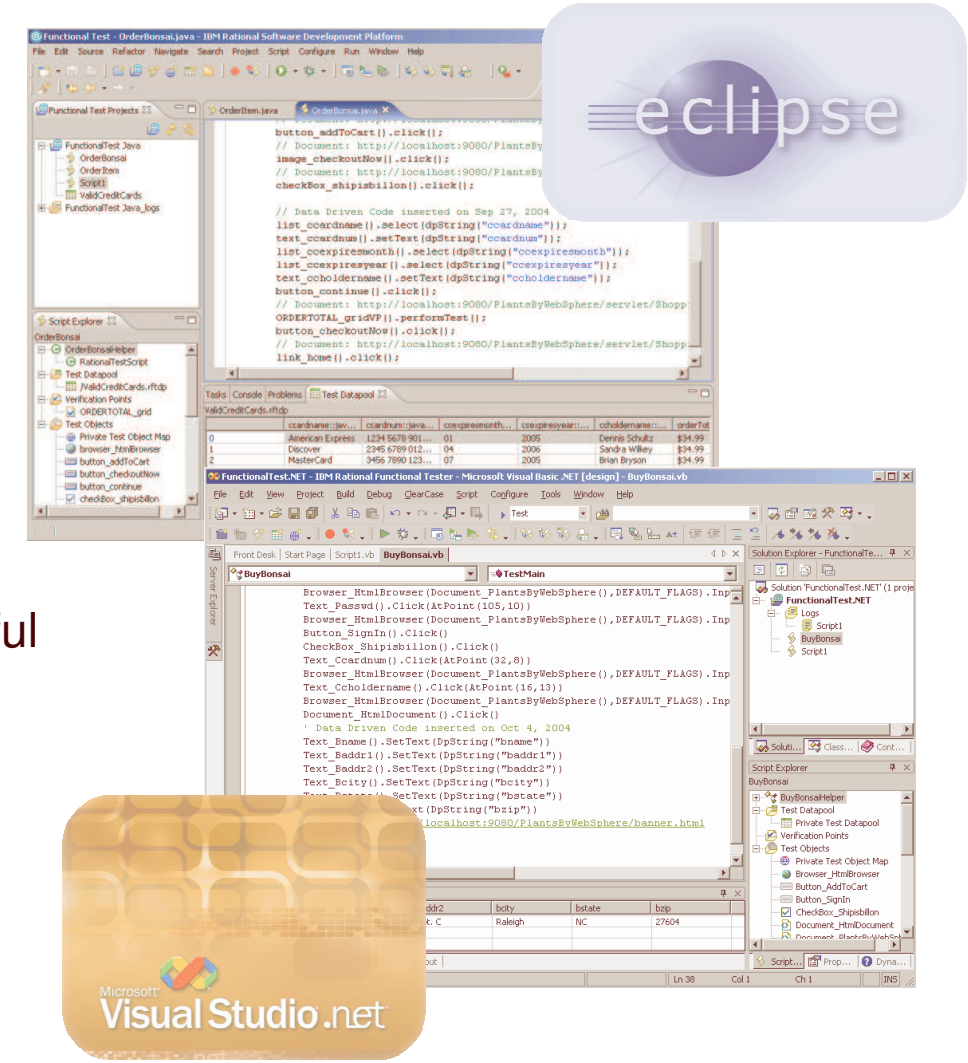
- Dynamic Data/Content Matching
  - Use pattern matching technique to verify dynamic data and create robust tests (ie. validate “Order ID ###” and not “Order ID 230”)
  - Accommodate a wide variety of acceptable responses as well as restrict acceptable responses to validate the application’s behavior
  - Build flexibility into your tests



Enhancing Scripts

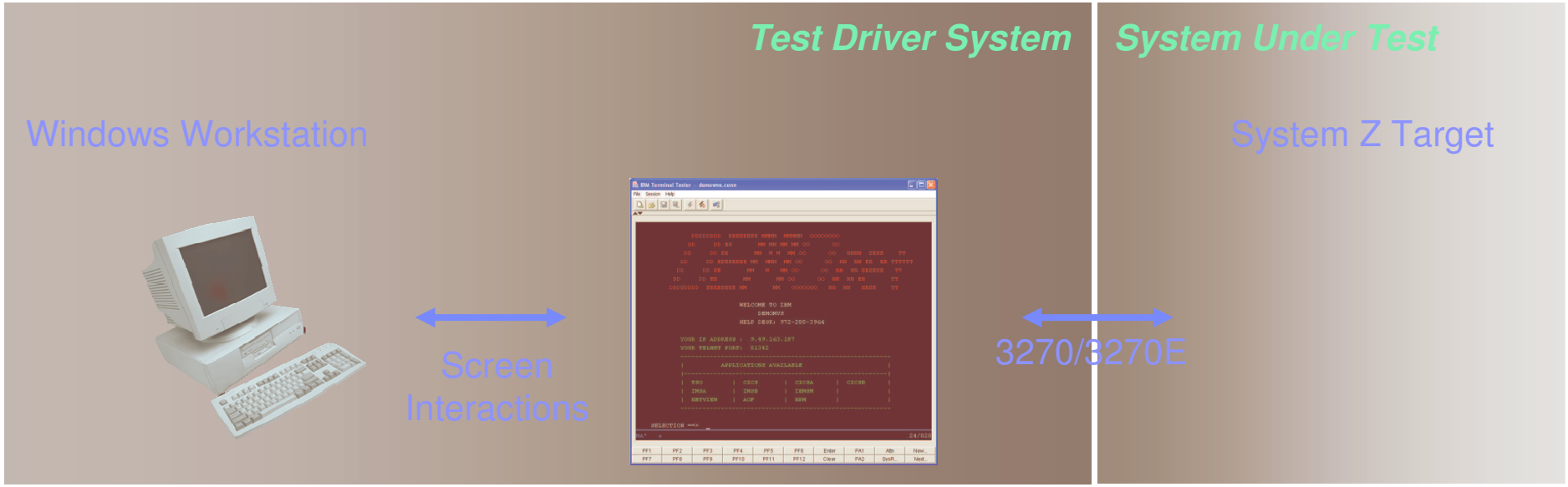
- Functional Tester offers two development environments
  - Eclipse based IBM Software Development Platform
  - Visual Studio .NET

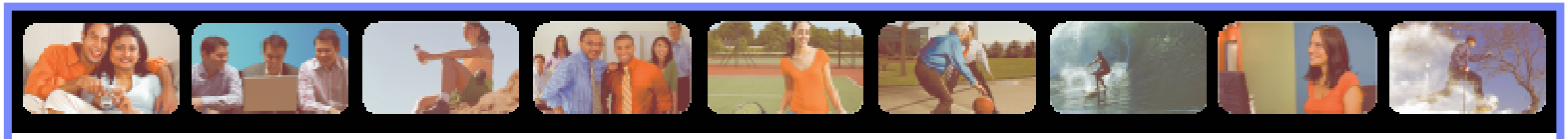
- Both environments offering powerful debugging features
  - Code assist editors
  - Step debugging
  - Variable watches
  - More…



IBM Rational Functional Tester for Terminal-based Applications

- Windows-based
- Java-based terminal emulator
- Nothing installed on the target





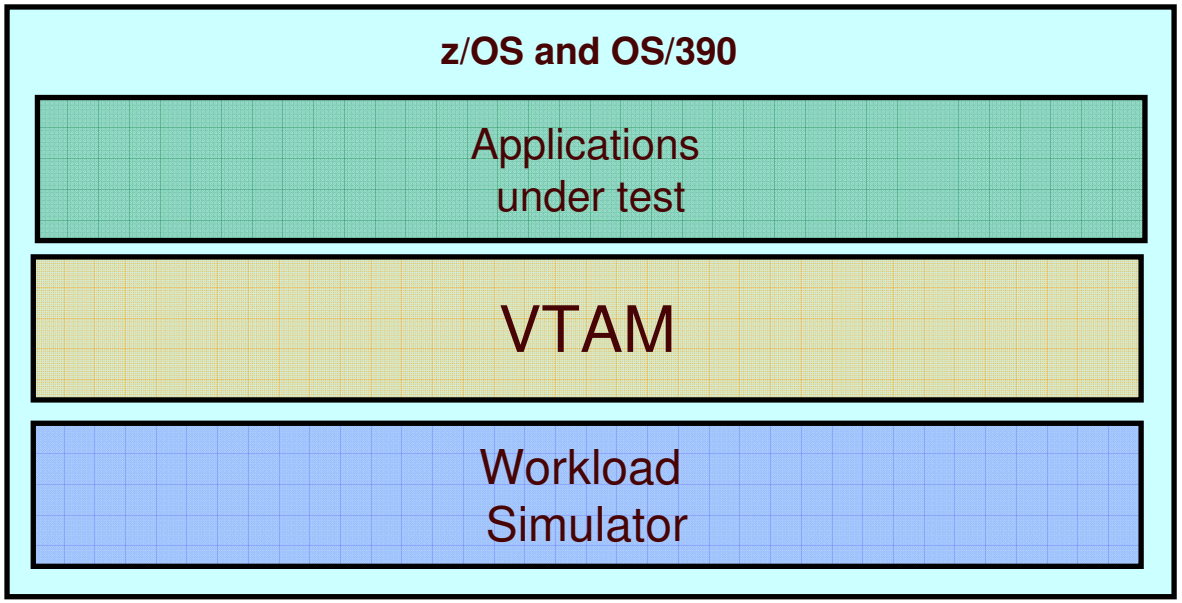
Demo

What You'll See:

Functional Testing with IBM Rational Functional Tester Extension for Terminal Based Applications

IBM Workload Simulator

- Conducts Reliable Stress, Performance, Regression, Function And Capacity Planning Tests
- All test execution and storage of test assets on System Z
  - Projects
  - Resources
  - Schedules
  - Test Criteria
  - Test Cases



IBM Workload Simulator Features

- Auto Generation Of Scripts
- Auto Generation Of Networks
- Controls Resource During Runs
- Simulates Different Terminals, Terminal Features And Terminal Operator Actions
- Executes Independently Of The System Under Test
- Provides utilities for post-test analysis
- REXX-like scripting language
- Conducts Reliable Stress, Performance, Regression, Function And Capacity Planning Tests
- Consistent Across Protocols
  - SNA, CPI-C, TCP/IP
- Consistent Across Operating Systems
  - z/OS & OS/390, MVS/ESA, VM/ESA

IBM Workload Simulator functional tests are simply performance tests with only one virtual user

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- Introduction
- Automated Functional Testing
- **Manual Functional Testing**
- Automated Performance Testing
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Manual Testing with Rational Manual Tester

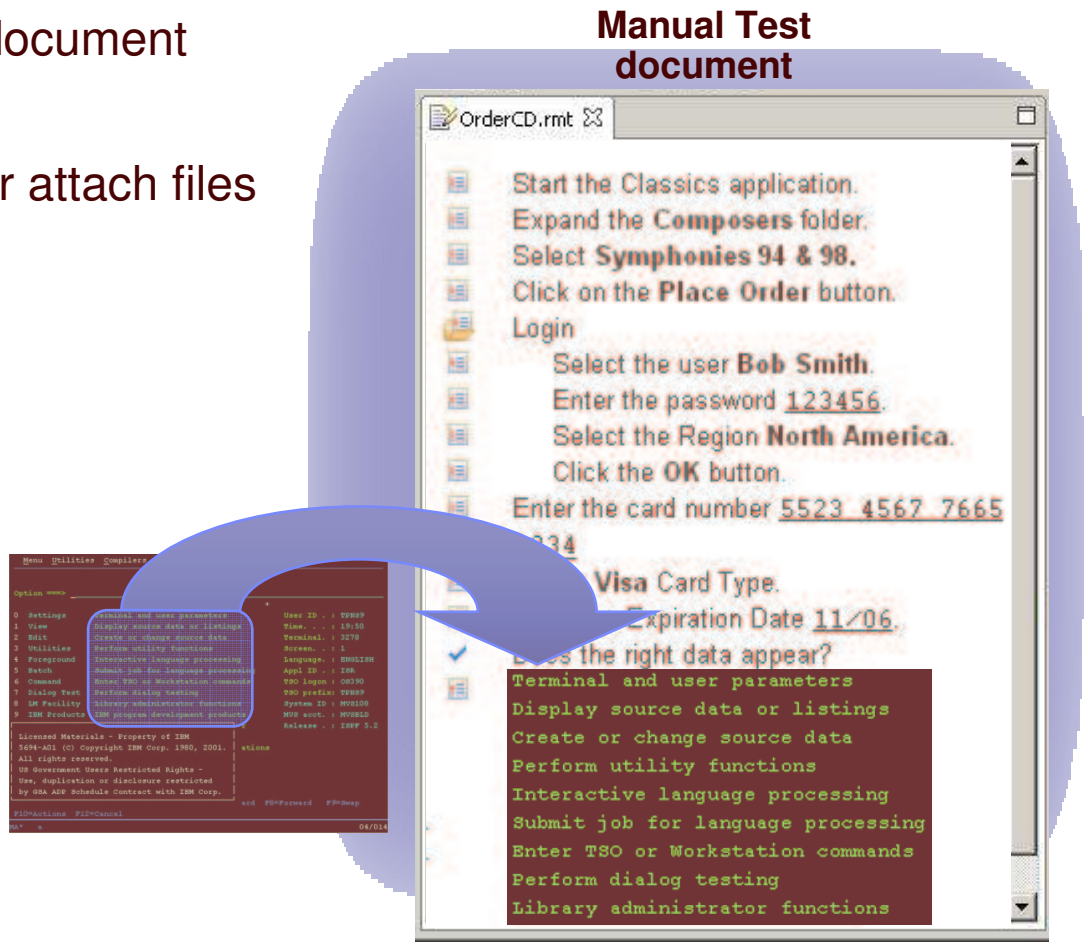
- Support analysts, subject-matter experts and professional testers
- Minimize test maintenance and ensure test consistency
- Reduce human error during data entry and data verification
- Develop detailed, easy to follow manual tests
- Support diverse usage models and processes

Analysts

Technical & non-technical Testers

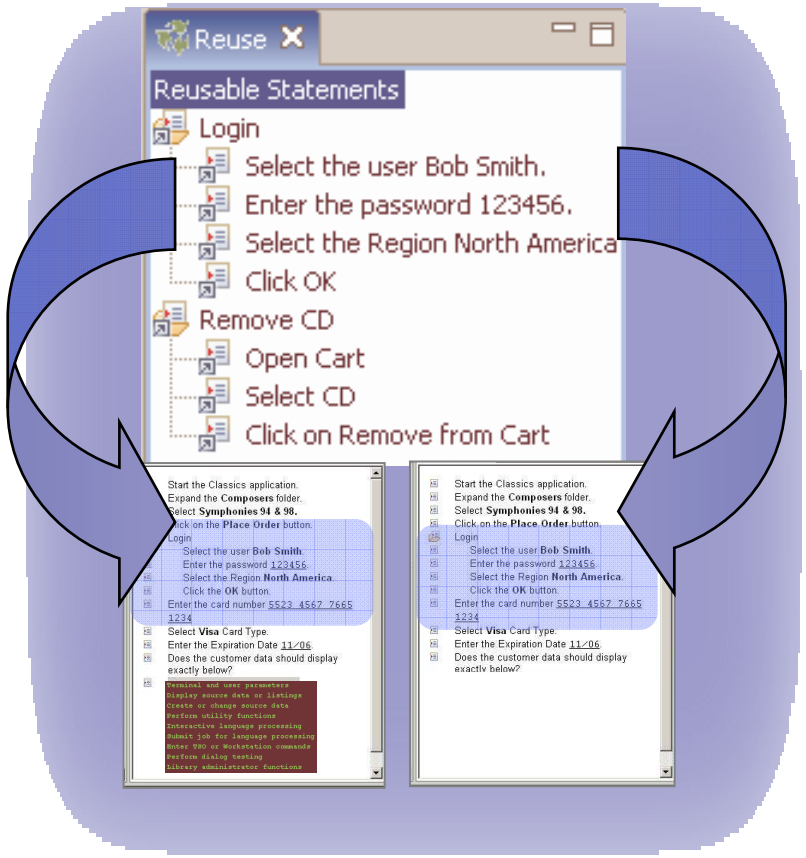
Create Robust, Easy to Follow Tests

- Provides a rich text editing to document clear, easy to understand tests
- Allows embedding of images or attach files to add clarity and detail
- Uses granular and broad verification points to capture both detailed observations and higher level test results



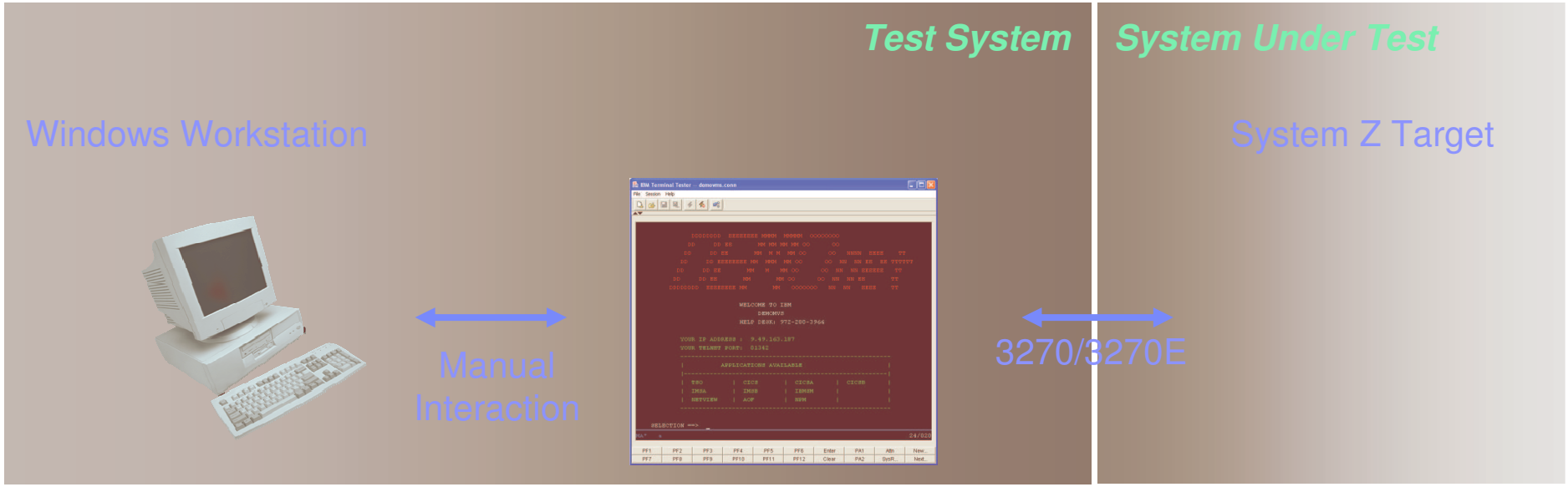
Enables Shared Content Across Scripts

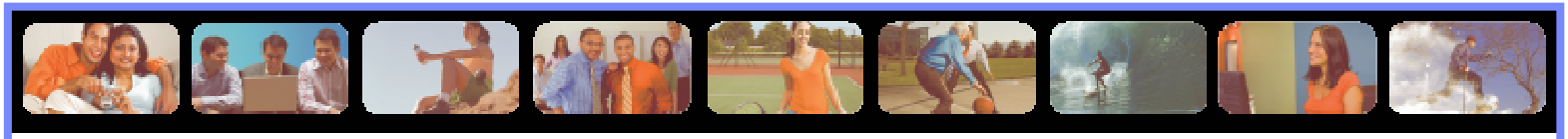
- Create commonly used test statements once
- Reuse statements across multiple tests through simple drag and drop
- Maintenance of shared content is efficient with single-point updating of shared content
- Ensures consistency and reduces test maintenance



IBM Rational Manual Tester

- Windows-based
- Same log format as Rational Functional Tester
- Nothing installs on the target





Demo

What You'll See:

Manual Testing with IBM Rational Manual Tester

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Performance Testing

- What is Performance testing?
  - *Testing conducted to evaluate the compliance of a system or component with specified performance requirements [IEEE 90].*
- How can load be generated?
  - Rational Performance Tester for z/OS
  - WebSphere Studio Workload Simulator
  - IBM Workload Simulator

Rational Performance Tester for z/OS

Leverage your System z hardware investment to test n-tier applications

Built for Day 1 Productivity

- Create code free tests
- Mask complexity to get the job done

Advanced Data Access & Manipulation

- Create code free schedules
- Automated data variation and synchronization

Lower Cost of Performance Testing

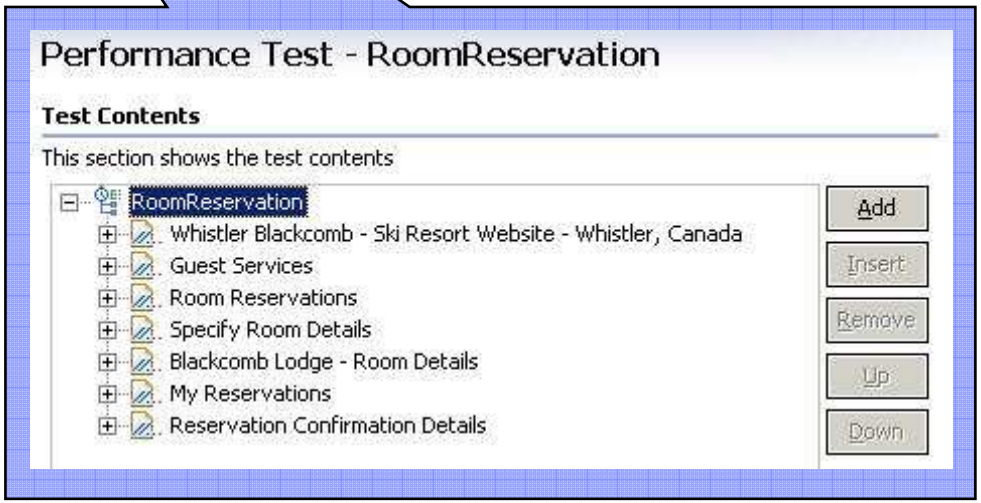
- Low resource requirements
- Re-use existing Java code in tests

No Code Tests

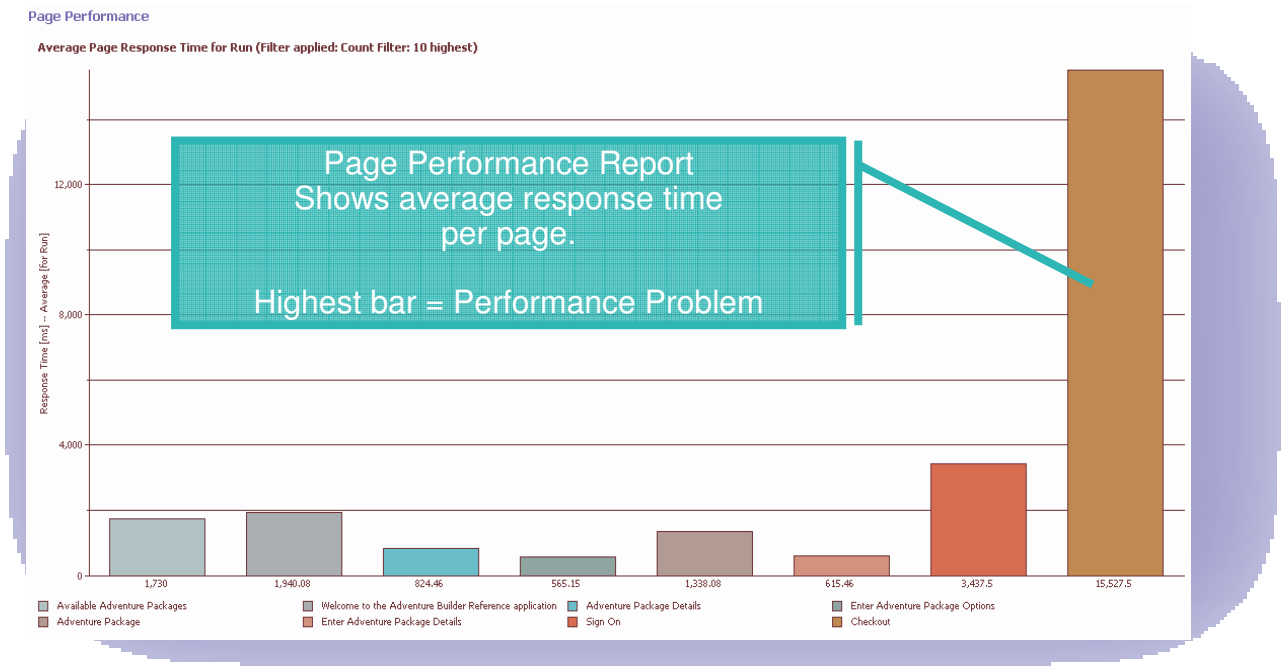
Tests are represented in a tree view as a list of web pages and their elements, such as images.

No programming necessary to create a test

Underlying detail is accessible but hidden to simplify test creation and maintenance



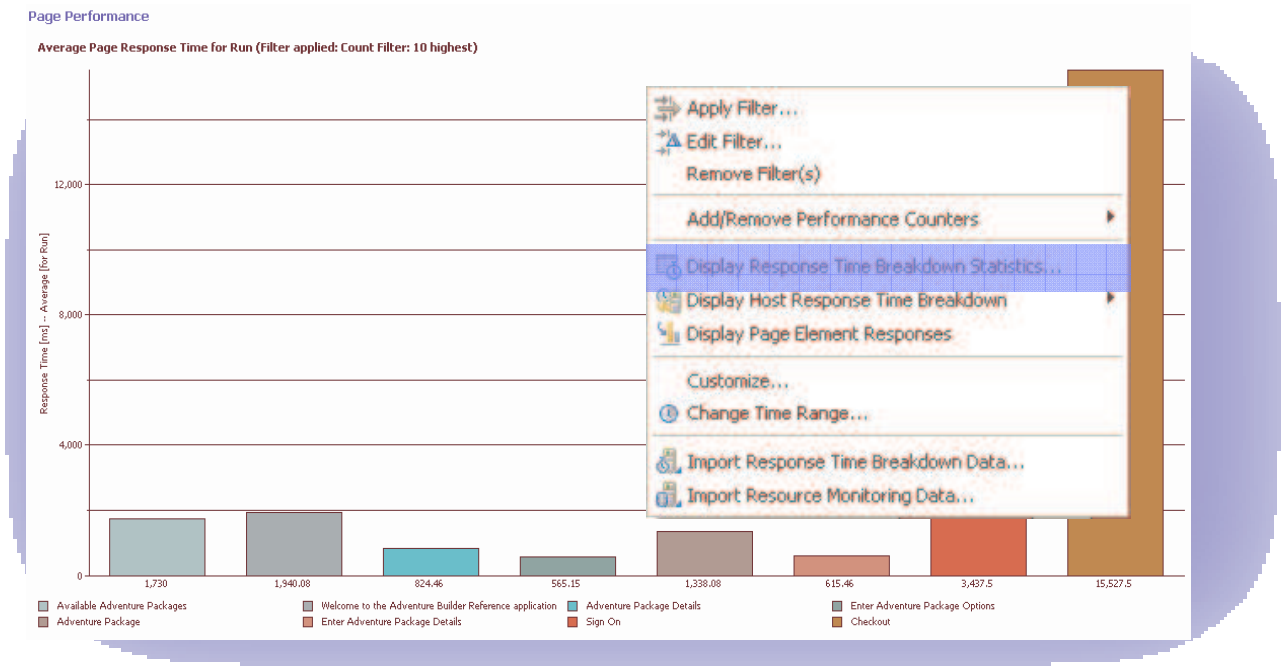
Performance Problem Identification During Test



Rational Performance Tester easily identifies bottlenecks

- Next logical question is Why?
- Root Cause Analysis provides to tools to answer this question

Performance Problem Identification During Test

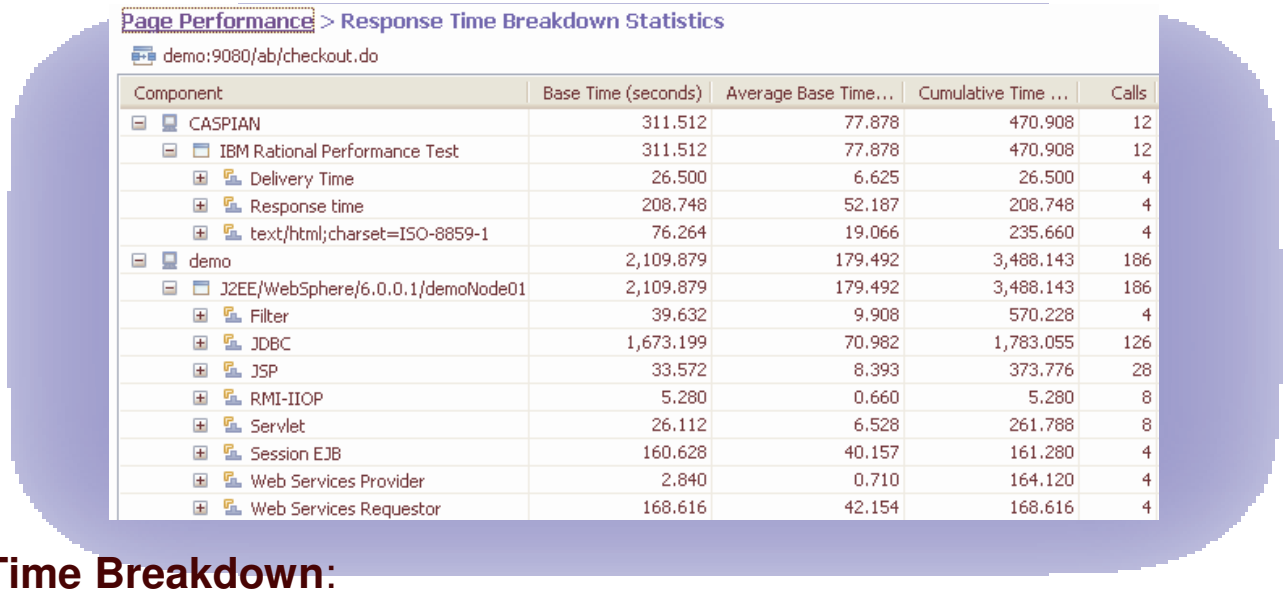


Rational Performance Tester easily identifies bottlenecks

Next logical question is Why?

Root Cause Analysis provides to tools to answer this question

Response Time Breakdown



Component	Base Time (seconds)	Average Base Time...	Cumulative Time ...	Calls
CASPIAN	311.512	77.878	470.908	12
IBM Rational Performance Test	311.512	77.878	470.908	12
Delivery Time	26.500	6.625	26.500	4
Response time	208.748	52.187	208.748	4
text/html;charset=ISO-8859-1	76.264	19.066	235.660	4
demo	2,109.879	179.492	3,488.143	186
J2EE/WebSphere/6.0.0.1/demoNode01	2,109.879	179.492	3,488.143	186
Filter	39.632	9.908	570.228	4
JDBC	1,673.199	70.982	1,783.055	126
JSP	33.572	8.393	373.776	28
RMI-IIOP	5.280	0.660	5.280	8
Servlet	26.112	6.528	261.788	8
Session EJB	160.628	40.157	161.280	4
Web Services Provider	2.840	0.710	164.120	4
Web Services Requestor	168.616	42.154	168.616	4

Response Time Breakdown:

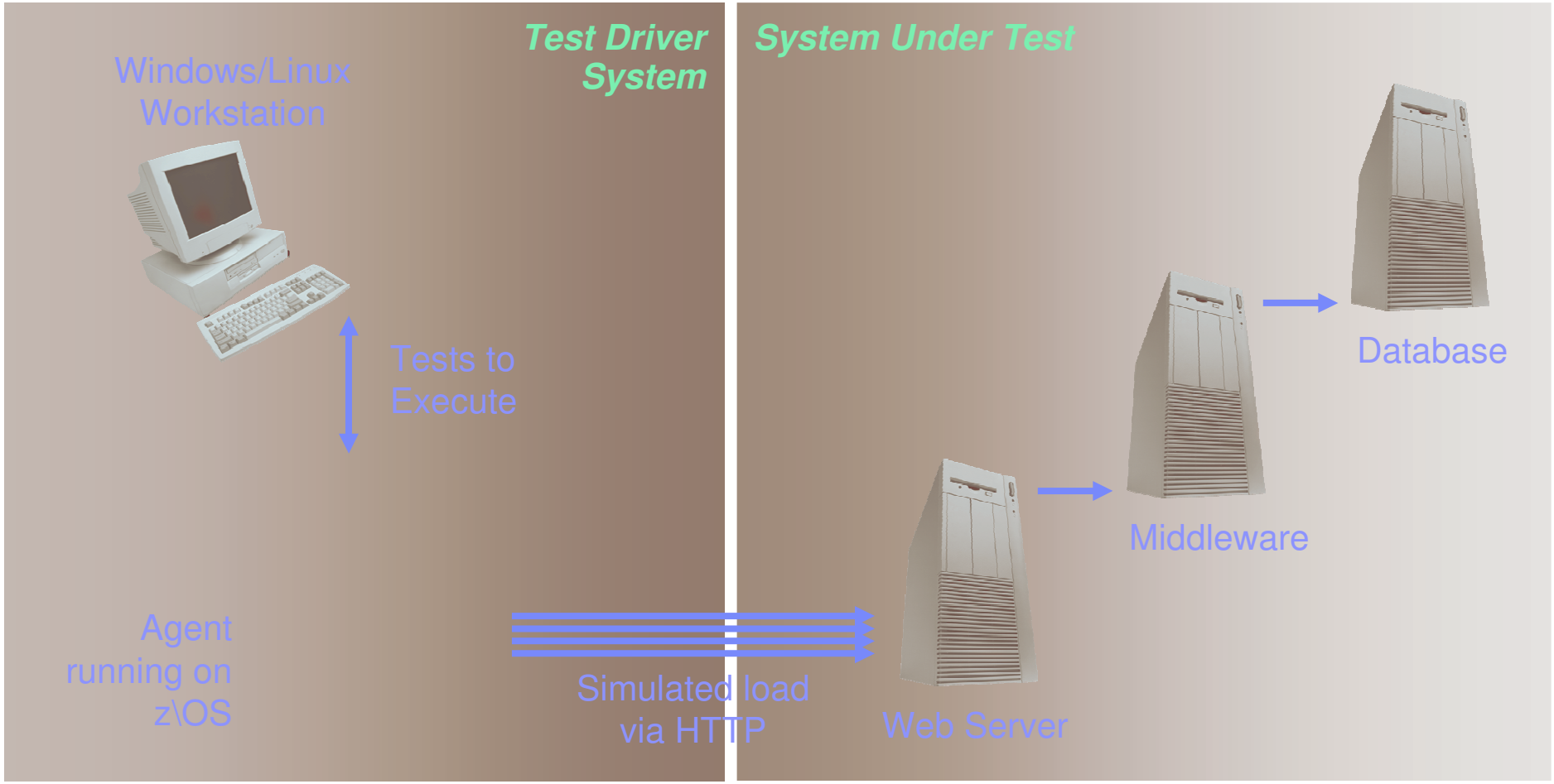
Breakdown page response times into composite element response time

Provides:

Breakdown data drills down to highlight slowest components of a given page.

Breakdown into tiers and components is a unique feature of Rational Performance Tester .

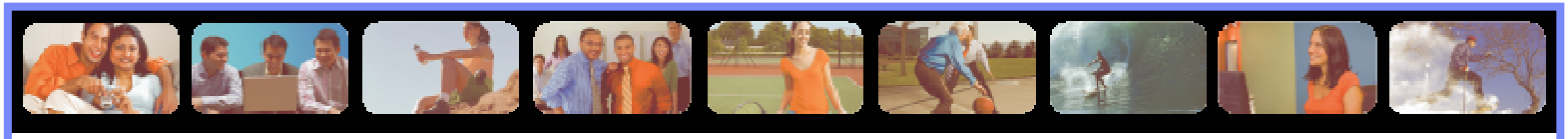
Rational Performance Tester for z/OS



Websphere Studio Workload Simulator

- IBM Rational Performance Tester for z/OS is a replacement for WebSphere Studio Workload Simulator (WSWS)
  - RPT for z/OS fulfills the HTTP load test use case provided by WSWS
- WSWS users should migrate to IBM Rational Performance Tester for z/OS
  - Contact your IBM Rational sales professional
  - No automated script migration is provided from WSWS to RPT for z/OS
    - You may use both products concurrently during the migration period
      - Use WSWS for old test scripts; use RPT on new projects
      - As old test scripts become outdated, record new scripts with RPT

Note: WebSphere Studio Workload Simulator is a different product from IBM Workload Simulator



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Root Cause Analysis with IBM Rational Performance Tester

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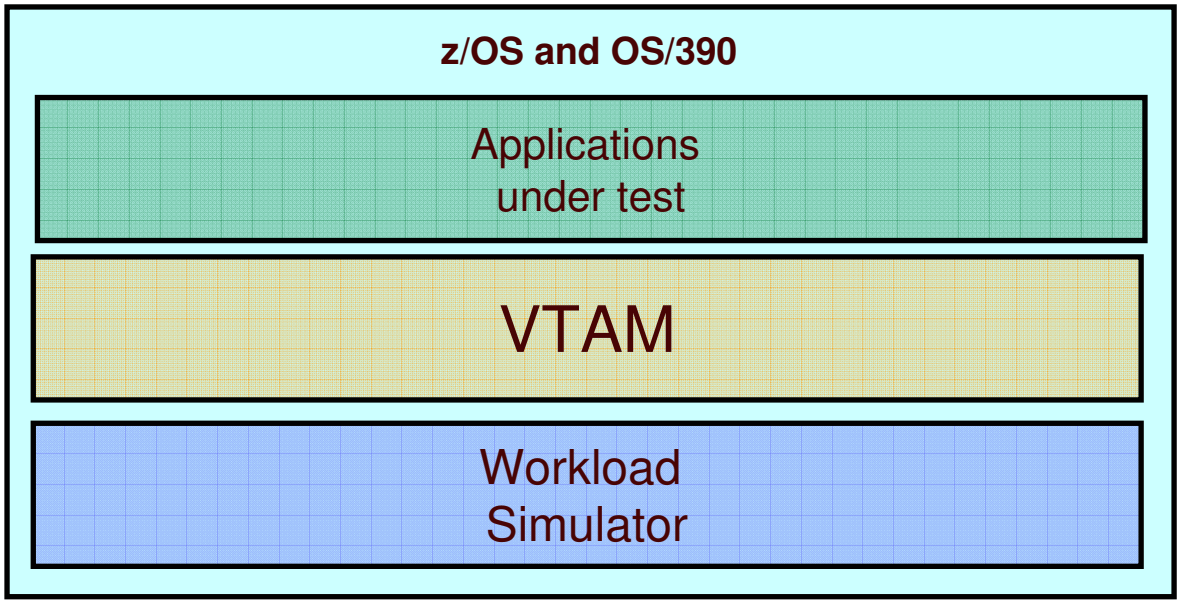
  - Test Cases



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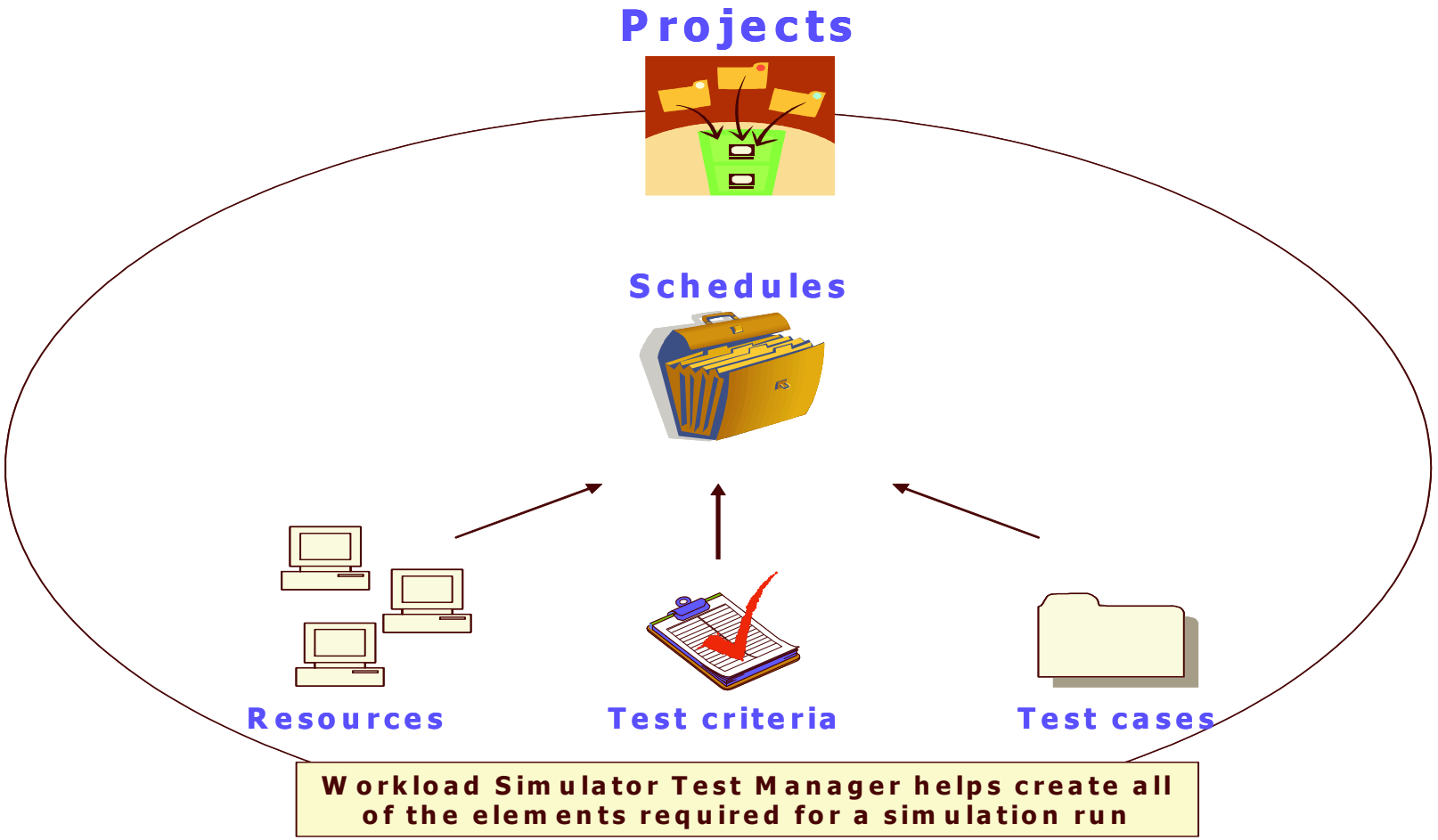
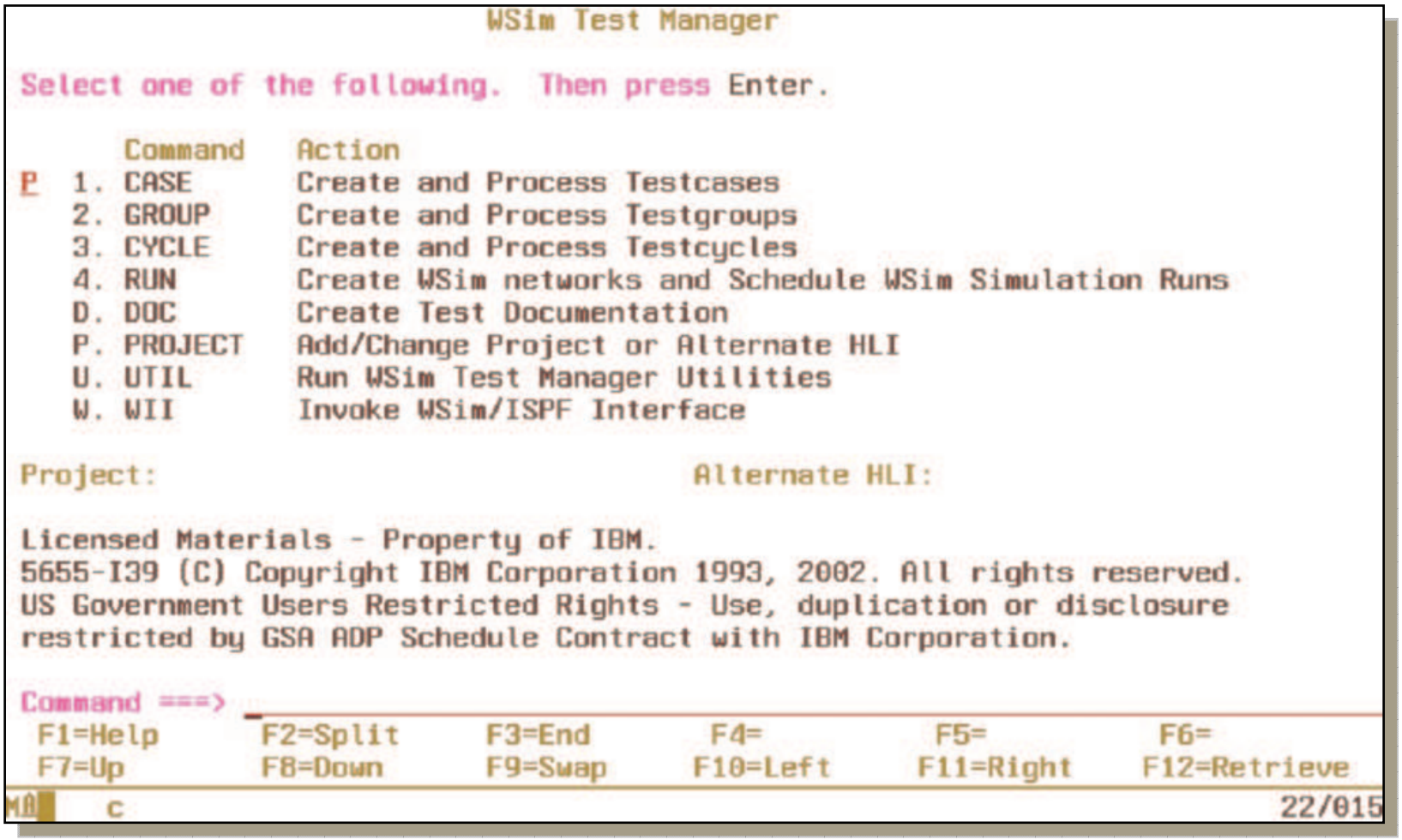
IBM Workload Simulator Benefits

- Provides a systematic approach to performance testing
- Simulates real-world conditions to determine operational boundaries of the product
- Used for:
  - Load-testing
  - Stress-testing
  - Regression Testing
  - QA Testing

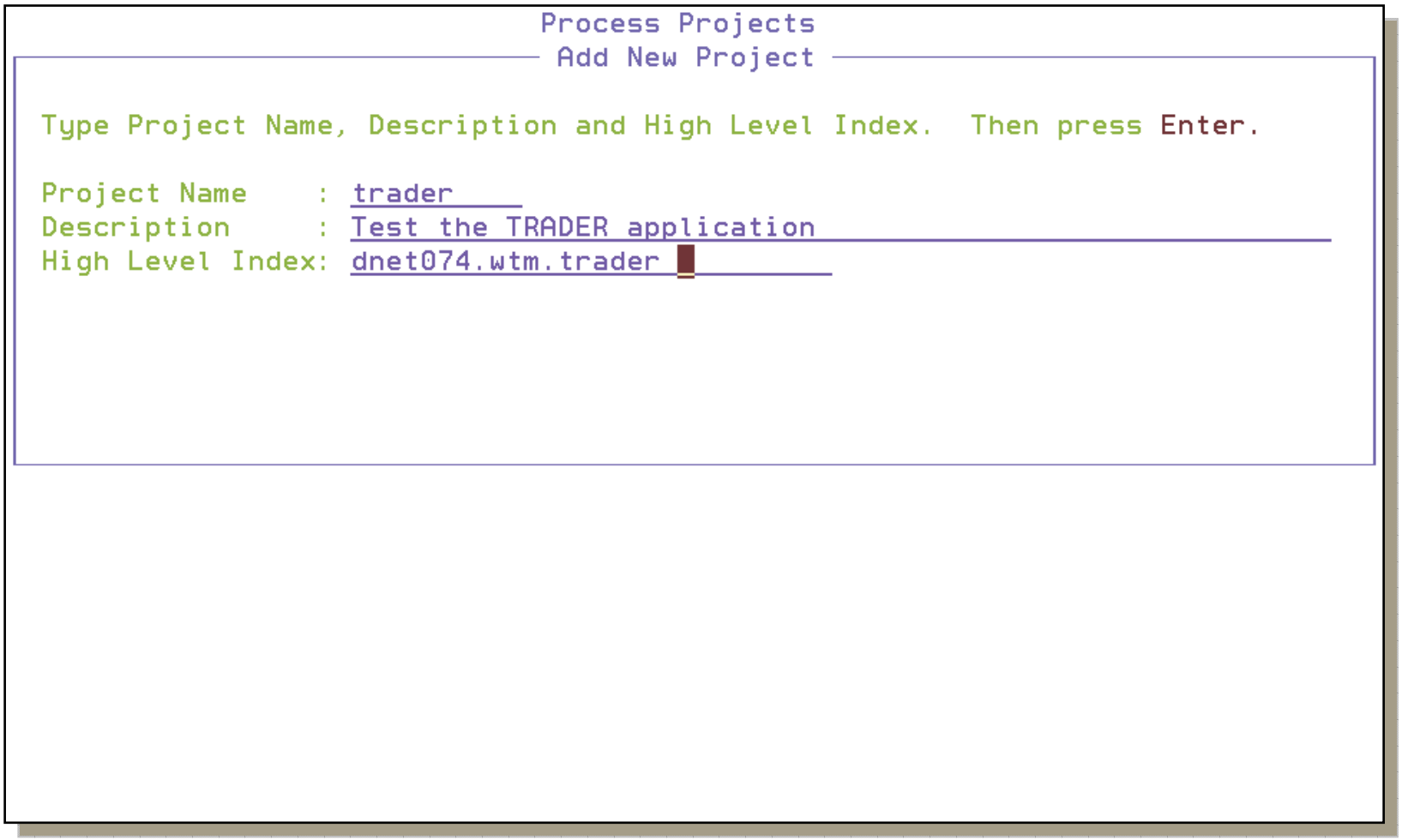
Workload Simulator‘s Test Manager



A User Friendly ISPF Interface



Group Test Cases and Schedules into Projects



Test Cases are Created in One of 6 Ways

```
                          Process Testcases
                           Add New Testcase
                                                      Enter required field
 Type Testcase Name, Description and Source.  Then press Enter.

 Testcase Name:  testrun
 Description   : Log on, Buy stock, Get quote, Log off
 Source        : 1  1. Add a 3270 testcase using IDC
                    2. Add a 3270 testcase using an SNA trace
                    3. Add a 3270 testcase using a WSim or IDC log
                    4. Add a testcase using the WSim STL models
                    5. Add a testcase using an STL skeleton
                    6. Add a CPI-C testcase using an LU 6.2 SNA trace
```

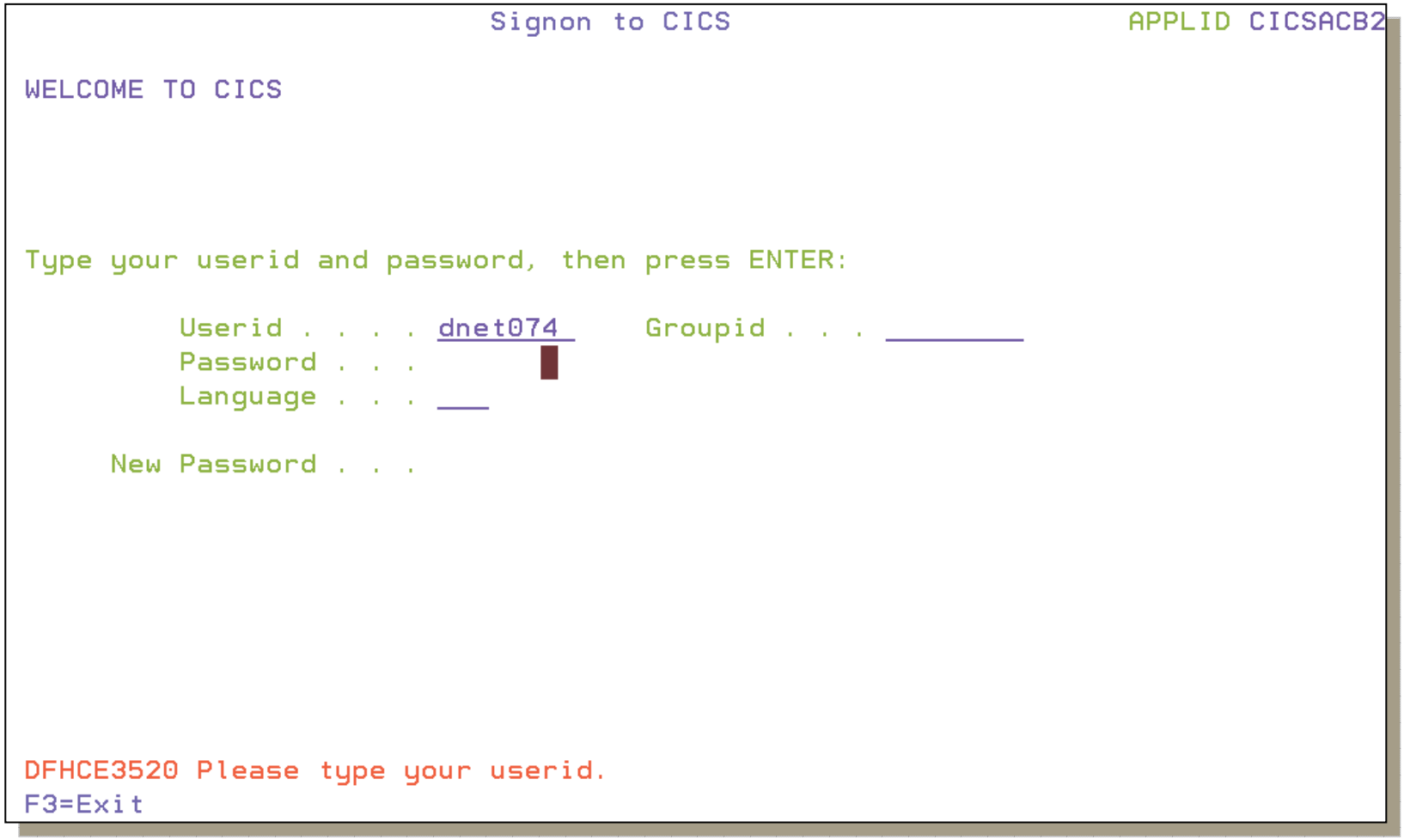
3 Ways to Capture Test Cases with IDC

```
IDCMAIN          WSim Interactive Data Capture (IDC) Utility

Select one of the following, then press Enter.

1 1. Start a session with a host application and capture data

  2. Generate an STL program from captured data
  3. Generate a message generation deck from captured data

  4. End the IDC utility program




WSim Version 1 Release 1.0.0  Program Number 5655-I39

Licensed Materials - Property of IBM
5655-I39 (C) Copyright IBM Corporation 1976, 2002.  All Rights Reserved.
US Government Users Restricted Rights - Use, duplication or disclosure
restricted by GSA ADP Schedule Contract with IBM Corporation.
F1=Help  F3=Exit  F12=Cancel
MA    c                                                        05/004
```

Capture Data from Different Address Space Types

```
IDCSSP          WSim IDC:  Start Session with Host Application

Type information, then press Enter.

Session Data
  Host application name . . . . . . . cicsacb2
  Logon mode name . . . . . . . . . . LSX32703 (Optional)
  Logon user data . . . . . . . . . . _____________________ (Optional)


IDC log data set name . . . . . . . . DNET074.WTMUSER.IDCLOG(TESTRUN)
  If data set already exists, specify R        (R=Replace or A=Append)

Start capturing data immediately? . . Y        (Y=Yes or N=No)

IDC Escape key  . . . . . . . . . . . PA1      (PAn, PFnn, CLEAR, or ATTN)




F1=Help  F3=Exit  F5=Refresh  F11=Save  F12=Cancel
```

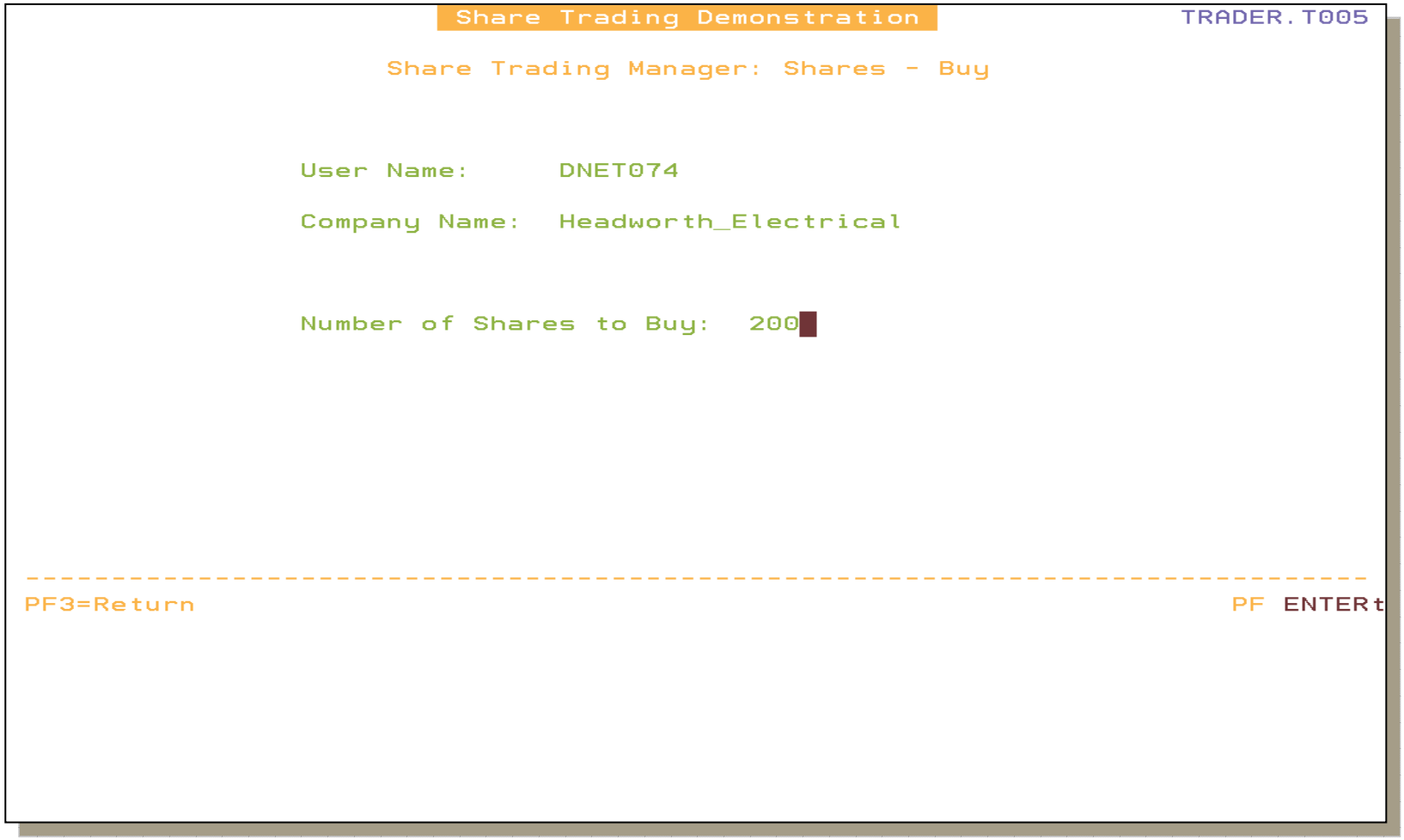
Interactive Data Capture Example



Captured Screens are Viewable by Panel or STL

```
                                Resource Display Index            Row 1 to 18 of 18
Command==>
Line commands: V to view panel, S to edit STL, D to delete.   Press PF3 to end.

  Timestamp AID     Testcase Panel
_ 13513804          TESTRUN                                  Signon to CIC
_ 13513804  ENTER   TESTRUN                                  Signon to CIC
_ 13514194          TESTRUN
_ 13514194  ENTER   TESTRUN  dstd
_ 13514476          TESTRUN                                Share Trading D
_ 13514476  ENTER   TESTRUN                                Share Trading D
_ 13514716          TESTRUN                                Share Trading D
_ 13514716  ENTER   TESTRUN                                Share Trading D
_ 13514993          TESTRUN                                Share Trading D
v 13514993  ENTER   TESTRUN                                Share Trading D
_ 13515168          TESTRUN                                Share Trading D
_ 13515168  ENTER   TESTRUN                                Share Trading D
_ 13515896          TESTRUN                                Share Trading D
_ 13515896  PF12    TESTRUN                                Share Trading D
_ 13520093          TESTRUN  Trader: Session Over          Share Trading D
_ 13520093  CLEAR   TESTRUN
_ 13520936          TESTRUN
_ 13520936  ENTER   TESTRUN  cesf logoff
******************************** Bottom of data ********************************
```

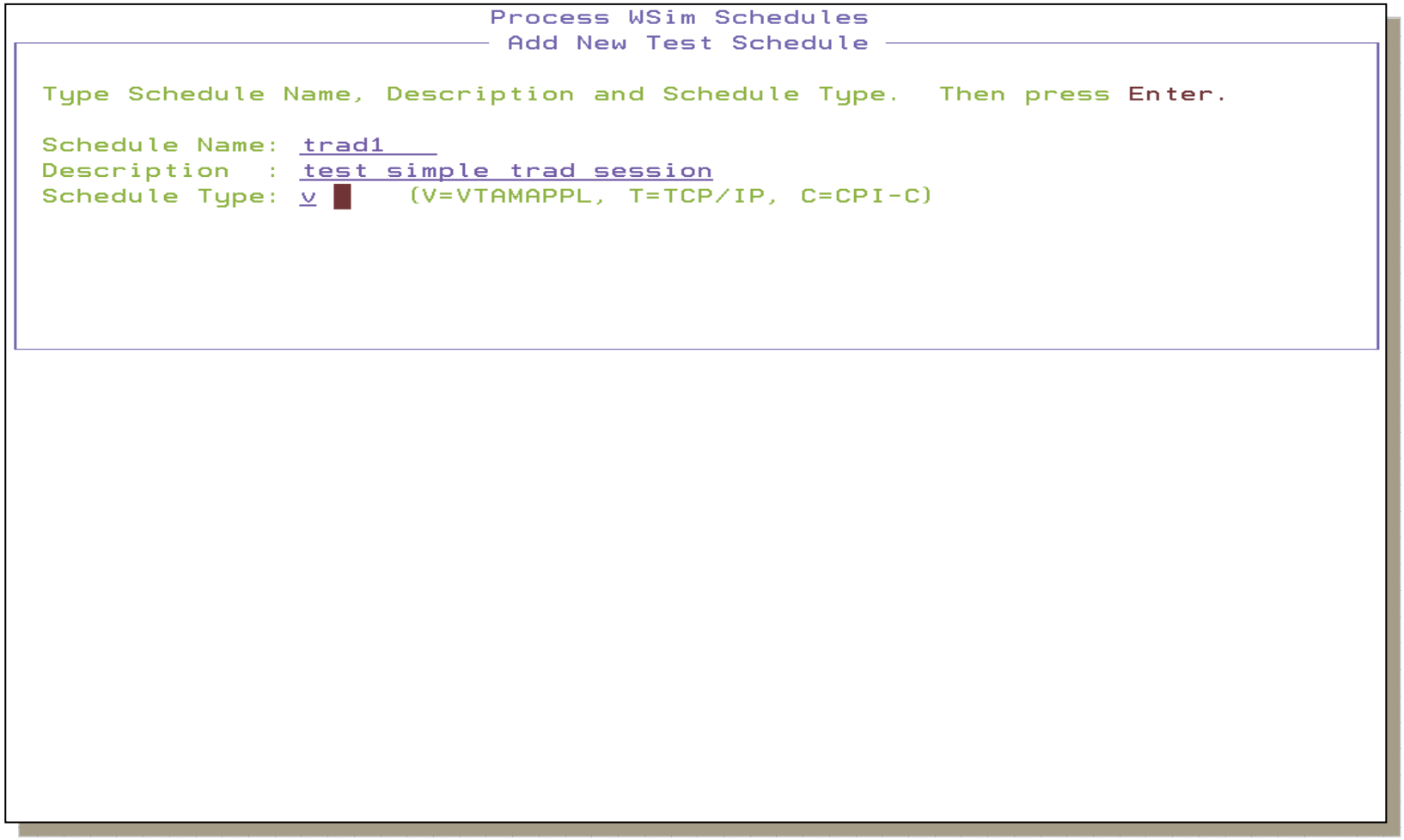
View of Captured Screen



Generated Script

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
VIEW       DNET074.WTM.TRADER.STL(TESTRUN) - 01.01          Columns 00001 00072
Command ===>                                                Scroll ===> CSR
000028 found = off
000029 initself('CICSACB2','LSX32703')
000030 do while found = off              /* wait for onin0001 data received */
000031  wait until onin
000032 end
000033 deact onin0001
000034
000035 /* 13:51:26.26 ITP1507I SESSION STARTED WITH APPLICATION CICSACB2 */
000036
000037 /*------------------------------------------------- 13513804 00001 */
000038 WTM_panel_ID = 'PNL00001'
000039 log 'WTM_panel_ID' WTM_panel_ID
000040 cursor(10,26)
000041 ereof
000042 charset 'field'
000043 type 'dnet074'
000044 cursor(11,26)
000045 ereof
000046 type 'dontlook'
000047 cursor(10,29)
000048 transmit using enter
000049
000050 /*------------------------------------------------- 13514194 00003 */
000051 WTM_panel_ID = 'PNL00002'
000052 log 'WTM_panel_ID' WTM_panel_ID
000053 cursor(24,48)
000054 ereof
000055 cursor(1,1)
```

Test Cases are Replayed Through Schedules



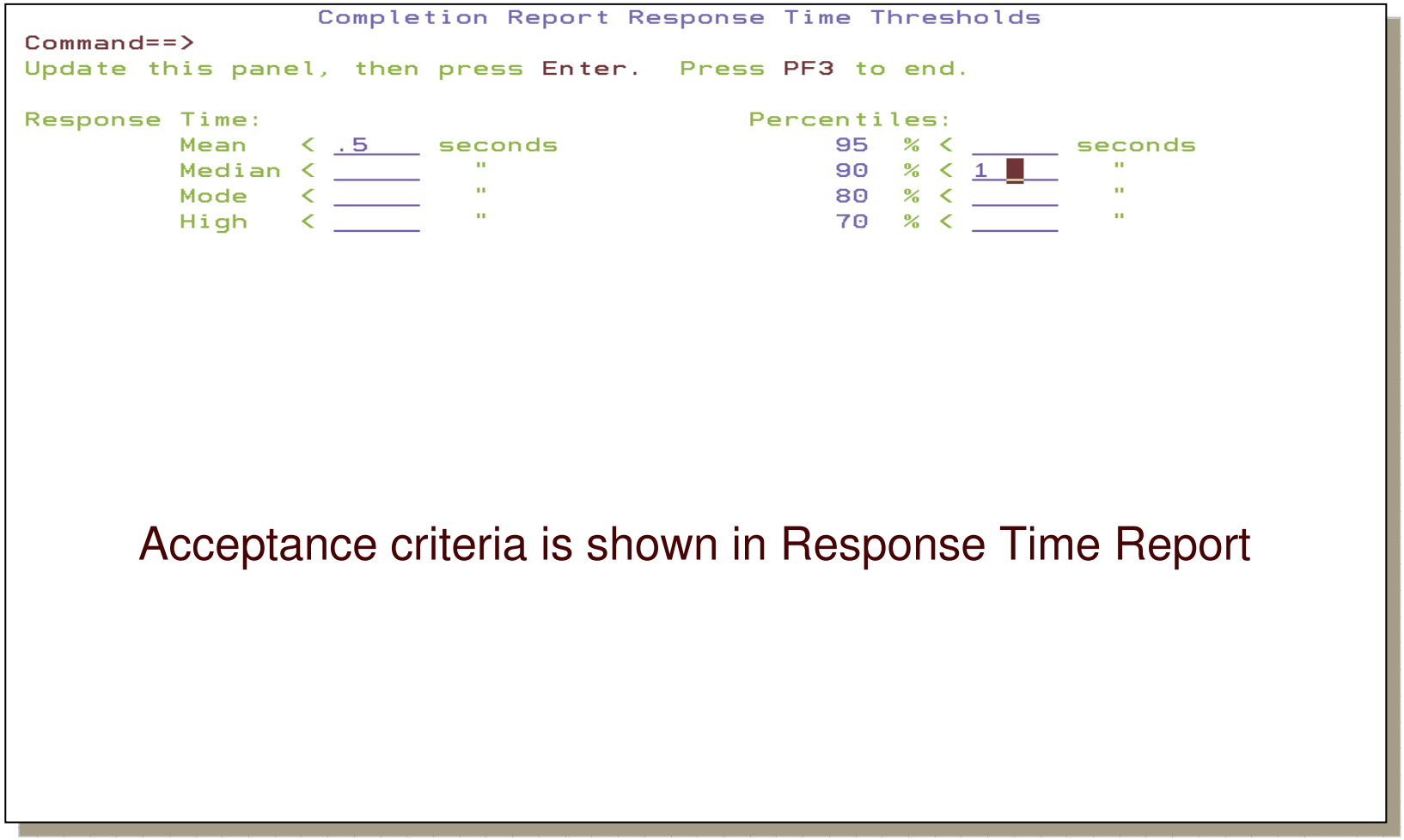
Assign Test Cases and # of Executions to a Schedule

```
                    Resource List for Schedule TRADLOAD      Row 1 to 1 of 1
          Specify Order for Resource LU1 under WSIM001
                                                                Row 1 of 11
Command==>
Enter order or summary.              Press PF3 to end.

Order                      Name        Test...   Type  Description
                           BUY         Case        V   buy stock
                           ENDTRAD     Case        V   End the trader application
                           INITRAD     Case        V   start the trader applicati
                           LOGOFF      Case        V   Log off CICS
                           LOGON       Case        V   log on to cics
                           QUOTE       Case        V   Get a stock quote
                           RETMENU     Case        V   Return to the Trader main
                           SELCOMP     Case        V   Select a company code from
                           SELL        Case        V   Sell stock
                           TESTRUN     Case        V   Log on, Buy stock, Get quo
1 2 3                      TRADALL     Group       V   Execute a complete Trader
****************************** Bottom of data ********************************


 F1=Help      F2=Split     F3=End       F4=          F5=          F6=Summary
 F7=Up        F8=Down      F9=Swap     F10=Left     F11=Right


F1=Help      F2=Split     F3=End       F4=          F5=          F6=Summary
F7=Up        F8=Down      F9=Swap     F10=Left     F11=Right    F12=Retrieve
```

Simulate Playback on Many Terminals via Schedules

```
                        Resource List for Schedule TRADLOAD          Row 1 of 15
Command==>
Enter command sort to sort by VTAMname.                          Press PF3 to end.
Line commands: S Select, I Insert, R Repeat, D Delete.

   VTAMname WSIMname  Test...  Name       Description
_  WSIM001  LU1       GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
   WSIM002  LU2       GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
_  WSIM003  LU3       GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
_  WSIM004  LU4       GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
_  WSIM005  LU5       GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
      "        "      GROUP    TRADALL    EXECUTE A COMPLETE TRADER APPLICATION
****************************** Bottom of data ********************************




 F1=Help      F2=Split     F3=End       F4=          F5=Sort      F6=
 F7=Up        F8=Down      F9=Swap      F10=Left     F11=Right    F12=Retrieve
```

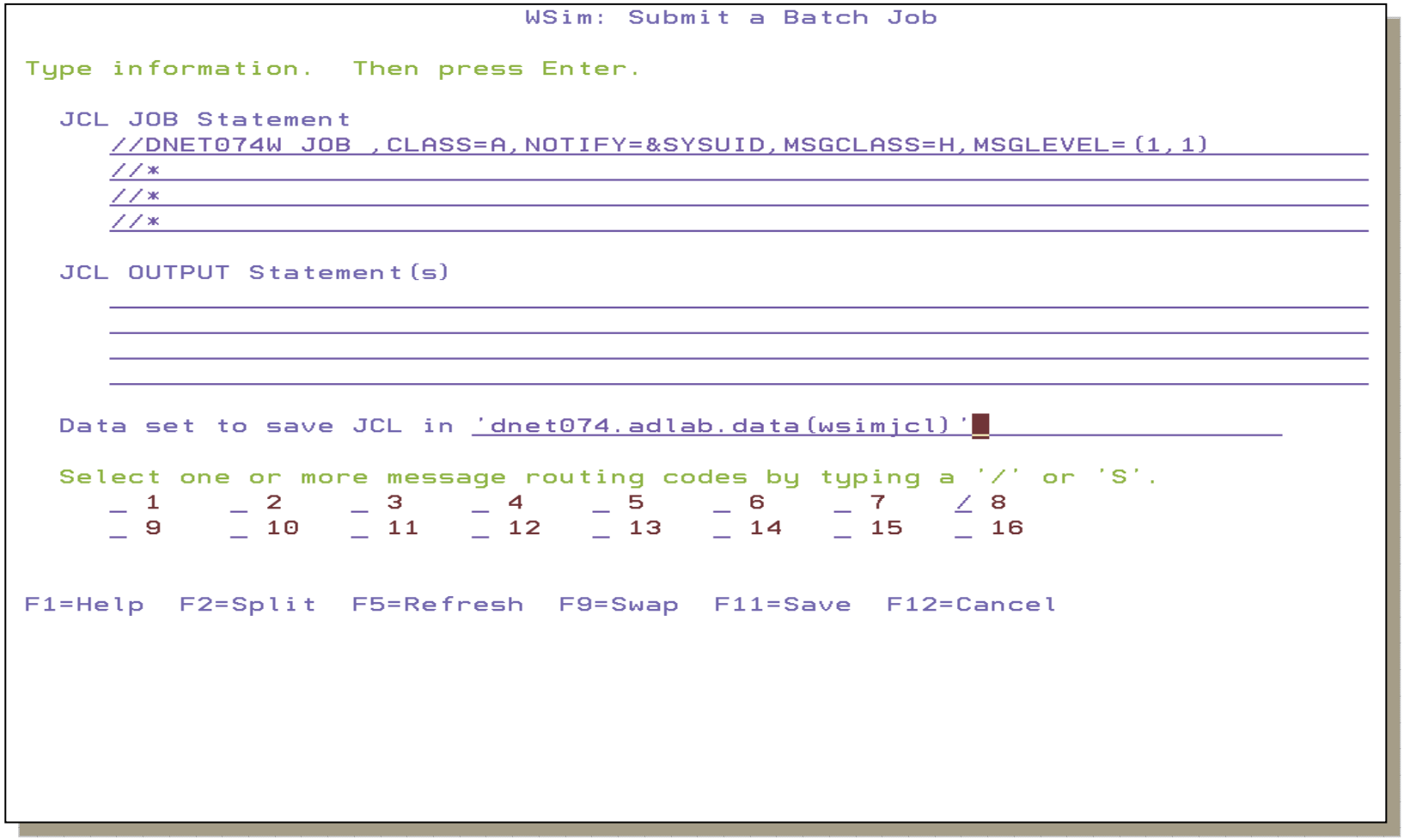
Specify Acceptance Criteria for Test Cases



Acceptance criteria is shown in Response Time Report

Schedules can be executed interactively...

...or executed as Batch Jobs



Utilities and Reports for Analysis Purposes

```
                          Reports for schedule TRAD1

Select one of the following.  Then press Enter.

       Command    Action                                                More:   +
1_  1. TLOG       View loglist report from the latest WSim run
    2. TRESP      View response time report from the latest WSim run
    3. TDM        Log display monitor for the latest WSim run
    4. TSP        View SYSPRINT from the latest WSim run

    5. MLOG       View baseline loglist report
    6. MRESP      View baseline response time report
    7. MDM        Log display monitor for the baseline log

    8. COMP       View screen compare report
    9. CDM        Log display comparator
   10. RTCOMP     Edit response time compare report

   11. COMPREP    Edit completion reports


Command===> _____________________________________________________________
```

Response Time Analysis Report Example

```
 File  Edit  Edit_Settings  Menu  Utilities  Compilers  Test  Help
VIEW       DNET074.WTM.SYSPRINT                          Columns 00001 00072
Command ===>                                              Scroll ===> CSR
000115 1WSim RESPONSE TIME REPORT
000116  RUN  TIME 14.05.55,  NOVEMBER 25, 2003  VERSION  1  RELEASE  1.0.0
000117 0-------------------------------------------------------------------
000118  SUMMARY  REPORT    NETWORK  ALL NETWORKS       PROCESS  SYSTEM      TIME
000119                                                 EXIT                 STAR
000120                                                 TERMTYPE             END
000121  -------------------------------------------------------------------
000122 -RESPONSE TIME    COUNT   RESPONSE TIME    COUNT   RESPONSE TIME    COUN
000123 0          0.00        5              0.10        5
000124 -MEAN   RESPONSE              0.05    MESSAGES SENT            11    NUMB
000125  MEDIAN RESPONSE              0.05       AVERAGE LENGTH        20
000126  MODE   RESPONSE                --                             RESP
000127  LOW    RESPONSE              0.00    MESSAGES RECEIVED        12    VARI
000128  HIGH   RESPONSE              0.10       AVERAGE LENGTH       303    95 P
000129  AVERAGE QUEUE TIME           0.01
000130 -PERCENTILE    RESPONSE TIME         AVERAGE
000131 0     10                    0.00          0.00
000132       20                    0.00          0.00
000133       30                    0.00          0.00
000134       40                    0.00          0.00
000135       50                    0.00          0.00
000136       60                    0.10          0.01
000137       70                    0.10          0.02
000138       80                    0.10          0.03
000139       90                    0.10          0.04
000140       95                    0.10          0.05
000141 1WSim RESPONSE TIME REPORT
000142  RUN  TIME 14.05.55,  NOVEMBER 25, 2003  VERSION  1  RELEASE  1.0.0
```

Screen Compare Report Example

```
                                    Differences Report        (continued)
Master: NETWORK    SAMPNET                                                  Test: NETWORK               SAMPNET
        VTAMAPPL   Workload Simulator1                                       VTAMAPPL   Workload Simulator2
        DEV/LU     VAPPL13-00001                                                DEV/LU    VAPPL23-00001
-------------------------------------------------------------------------------------------------------------------------------
MASTER Screen Image      MASTER Sequence Number 6     TEST Sequence Number 6       Location of Difference (15,46)
          1         2         3         4         5         6         7         8
   12345678901234567890123456789012345678901234567890123456789012345678901234567890
   --------------------------------------------------------------------------------
  1|                                                                        Set B| 1
  2|                            Log Compare Screen                             | 2
  3|                                                                           | 3
  4|                                 Mask mmmm                                 | 4
  5|                                                                           | 5
  6|                          Lower / Uppercase Example                        | 6
  7|                                                                           | 7
  8|                                                                           | 8
  9|                                                                           | 9
 10|                                                                           | 10
 11|                                                                           | 11
 12|                                                                           | 12
 13|                                                                           | 13
 14|                                                                           | 14
 15|                  This is data field one: Hello                            | 15
 16|                                                                           | 16
 17|                                                                           | 17
 18|                  This is data field two: aaaaa                            | 18
 19|                                                                           | 19
 20|                                                                           | 20
 21|                                                                           | 21
 22|                                                                           | 22
 23|                                                                           | 23
 24|                                                                           | 24
   --------------------------------------------------------------------------------
   12345678901234567890123456789012345678901234567890123456789012345678901234567890
            1         2         3         4         5         6         7         8
     CURSOR: ROW( 18) COLUMN( 46)    AID: ENTER KEY             WHEN LOGGED: END OF MSG GEN
     DIMENSIONS: ( 24, 8)
```

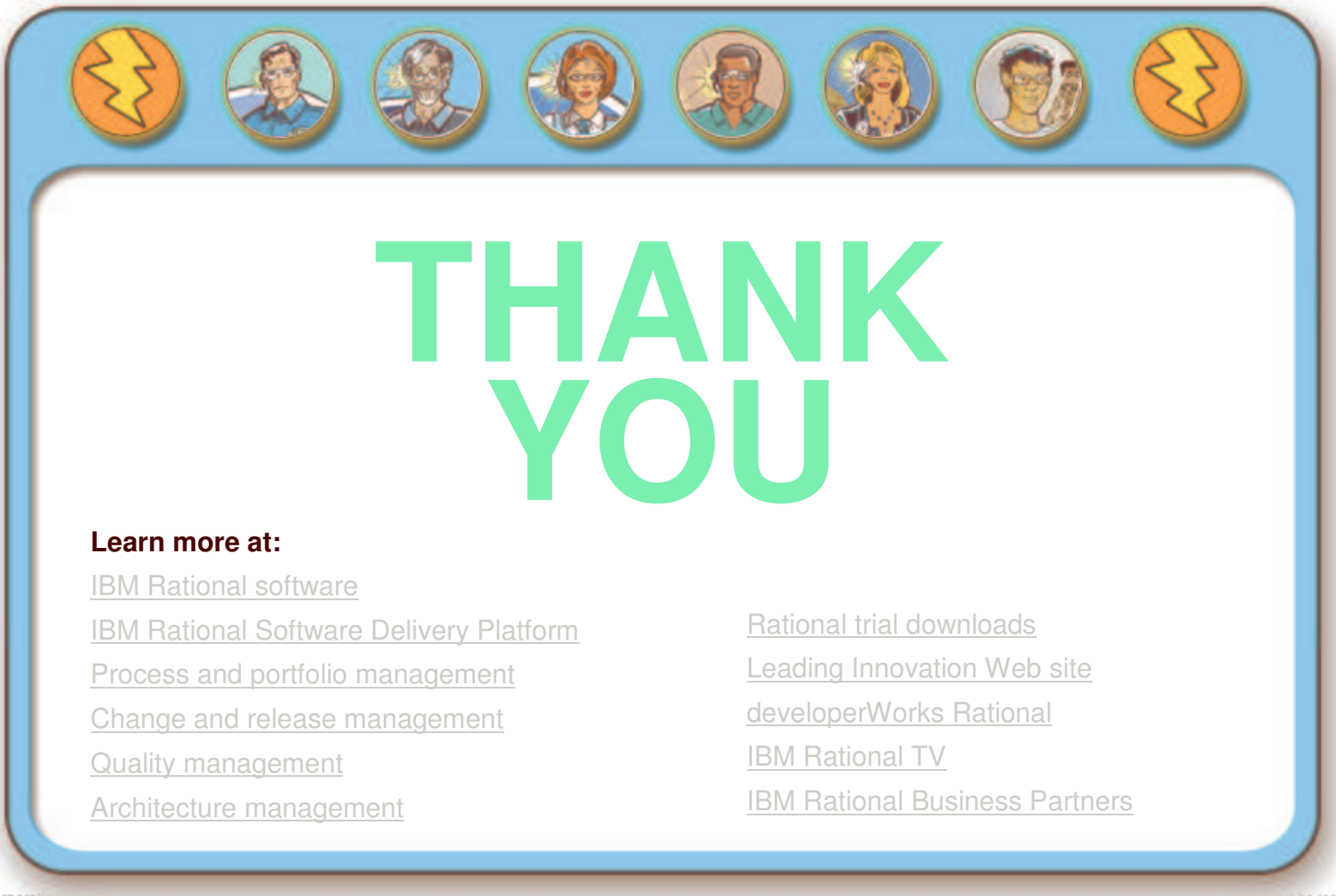
Agenda

- Introduction
- Automated Functional Testing
- Manual Functional Testing
- Automated Performance Testing
- **Summary**

Summary

- Rational Functional Tester Extension for Terminal-Based Applications
  - Extend the benefits of Rational Functional Tester to System Z and System I applications
- Rational Manual Tester
  - Manage and organize testing of any system - even hardware
- Rational Performance Tester for z/OS
  - Leverage the power of System z hardware to scale performance testing
  - Replaces WebSphere Workload Simulator
- IBM Workload Simulator
  - Host all your testing artifacts on System z
  - Perform all your test activities on System z


QUESTIONS



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