Department of Veterans Affairs

Veterans Health Administration (VHA)

Office of Informatics and Analytics

Innovation Program

OneVA Pharmacy Implementation Project

Master Test Plan

(CLIN #0004AA)

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# Introduction

Leadership at the Department of Veterans Affairs (VA) initiated the OneVA Pharmacy Implementation project to enhance and integrate the OneVA Pharmacy prototype into Veterans Health Information Systems and Technology Architecture (VistA). The OneVA Pharmacy module will provide the Department of Veterans Health Administration (VHA) the capability to allow Veterans travelling across the United States to refill their active VA prescription at any VA Pharmacy regardless of where the prescription originated. The module expands available pharmacy information in VistA to pharmacists providing direct access to any active and refillable prescription from any VA Healthcare System. The OneVA Pharmacy Implementation project modifies the existing prototype software to expand its current capability and includes the development of documentation to support a national rollout in March 2016.

The OneVA Pharmacy module and this implementation provides a foundation to build and extend new capabilities to the Veteran, who are better served by integrating virtual care into pharmacies, using technology to close the gap between the previous quality of information, and the Veteran's level of engagement. A well-designed OneVA Pharmacy builds upon the history of the VHA and advances in modern technology to allow Veterans to take a more active role in their own health care.

## Purpose

The OneVA Pharmacy Implementation Master Test Plan is the project plan for the testing work to be done for the OneVA Pharmacy software and middleware components. At a high level, testing will be conducted on the following:

* VistA Patch PSO\*7\*454
  + PSO LM BACKDOOR ORDERS
    - Validation of updates to remote VistA sites
* VAeMI-Middleware
* Connectivity to the Health Data Repository/ Clinical Data Services (HDR/CDS) via the Enterprise Service Bus (eMI)
* Validation of Health Level 7 (HL7) messages

The testing activities will be performed initially by the OneVA Pharmacy Implementation project team and then will roll out to specific VA test sites to perform the Initial Operating Capability (IOC) testing. As of this writing, these sites are ‘to be determined’.

## Acronyms and Abbreviations

The following table provides the list of acronyms used throughout the document along with their descriptions.

Table 1: Acronym & Abbreviation Table

| Acronym/Abbreviation | Description |
| --- | --- |
| [PSO LM BACKDOOR ORDERS] | Patient Prescription Processing |
| ADT | Admission Discharge Transfer |
| AITC | Austin Information Technology Center |
| API | Application Programming Interface |
| BITS | Business Information Technology Solutions, Inc. |
| CDS | Clinical Data Services |
| CLIN | Contract Line Item Number |
| COR | Contracting Officer’s Representative |
| DFN | Data File Number |
| DHCP | Dynamic Host Configuration Protocol |
| DLO | Dispense Local Order |
| DoD | Department of Defense |
| DRO | Dispense Remote Order |
| E&IT | Electronic and Information Technology |
| EHR | Electronic Health Record |
| eMI | Enterprise Messaging Infrastructure |
| ESB | Enterprise Service Bus |
| ESE | Enterprise System Engineering |
| ETS | Enterprise Testing Service |
| FORUM | A system developed and maintained to provide a national communications system for use within the VA. |
| HDR | Health Data Repository |
| HL7 | Health Level 7 |
| IBM | International Business Machine |
| ICN | Integration Control Number |
| IDE | Integrated Development Environment |
| IOC | Initial Operating Capability |
| IT | Information Technology |
| MLLP | Minimal Lower Layer Protocol |
| MUMPS | Massachusetts General Hospital Utility Multi Programming System |
| MVI | Master Veteran Index |
| OI&T | Office of Information and Technology |
| OIA | Office of Informatics and Analytics |
| OR | Operational Readiness |
| PD | Product Development |
| PMAS | Project Management Accountability System |
| PSI | Patient Safety Issue |
| PSO | Outpatient Prescription Pharmacy |
| PWS | Performance Work Statement |
| QA | Quality Assurance |
| RDNG | IBM Rational DOORS Next Generation |
| REST | Representational State Transfer |
| RPT | Reports |
| RSD | Requirements Specification Document |
| RTC | Rational Team Concert |
| RTM | Requirements Traceability Matrix |
| SDD | System Design Document |
| SME | Subject Matter Expert |
| SOA | Service Oriented Architecture |
| SQA | Software Quality Assurance |
| TRM | Technical Reference Model |
| UFT | Unit Functionality Testing |
| VA | Department of Veterans Affairs |
| VAeMI-Middleware | The middleware components being implemented within the OneVA Pharmacy software development. |
| VHA | Department of Veterans Health Administration |
| VistA | Veterans Health Information Systems and Technology Architecture |
| VO | View Order |
| WPR | Work Product Review |

## Test Objectives

The OneVA Pharmacy Implementation Master Test Plan supports the following objectives:

* To test 100% of the business rules, functional requirements, and design constraints documented in the OneVA Pharmacy Implementation Requirements Specifications Document (RSD)
* To test all components documented in the OneVA Pharmacy Implementation System Design Document (SDD)
* To execute 100% of the test cases during User Functionality Testing
* To execute the Performance Testing requirements documented in the OneVA Pharmacy Implementation RSD Section 2.9
* To create, maintain, and control the test environment

The objective of the OneVA Pharmacy Implementation Master Test Plan is to document the following:

* Tests to be performed and the expected results for the business rules, functional requirements, and design constraints documented in the OneVA Pharmacy RSD
* Tests to be performed and the expected results for the components documented in the OneVA Pharmacy SDD
* The process of how the tests are being developed
* The process of how the tests will be performed
* The environment in which tests will be executed
* The schedule for running tests
* Roles and responsibilities for testing
* Risks

## Roles and Responsibilities

**Table 2** lists the key roles and responsibilities for executing the OneVA Pharmacy Implementation Master Test Plan.

Table 2: Roles and Responsibilities

| Role | Responsibility |
| --- | --- |
| QA Tester | Performs quality assurance to all aspects of testing including test cases, scripts, and results. |
| Project Coordinator/Trainer/Technical Editor | Responsible for ensuring all documentation meet VA and Section 508 standards and are maintained and delivered to OneVA Pharmacy Contracting Officer’s Representative (COR). |
| Stakeholders | Persons that hold a stake in a situation in which they may affect or be affected by the outcome. |
| Subject Matter Expert | Person responsible for ensuring full execution of the test process to include the verification of technical requirements and the validation of business requirements. |
| System Architect | Develop and implement the VAeMI-Middleware components. |
| Test Lead | Leads and coordinates activities related to all aspects of testing based on an approved Master Test Plan and schedule. Participates in the development and execution of test scripts. |
| Technical Lead/Project Manager | Responsible for obtaining approval and implementing the OneVA Pharmacy Master Test Plan. |
| VA Business Sponsor | Person that has overall responsibility for the successful planning and execution of a project. |
| VA Project Manager | Overall responsibility for the successful implementation of the OneVA Pharmacy Implementation project. |
| VistA Developer | Modify the VistA software and coordinate the Patch release. |

## Processes and References

The processes that guide the implementation of the OneVA Pharmacy Implementation Master Test Plan are:

* Test Preparation
* Product Build
* Independent Test and Evaluation

The references that support the implementation of the OneVA Pharmacy Implementation Master Test Plan are:

* [ProPath](http://vaww.oed.wss.va.gov/process/home.aspx)
* [Section 508 Office Web Page](http://vaww.vista.med.va.gov/508workgroup)
* [Privacy Impact Assessment - Privacy Service](http://www.privacy.va.gov/Privacy_Impact_Assessment.asp)

The references that support the implementation of the OneVA Pharmacy Implementation Master Test Plan are:

* Requirements Specification Document (RSD) Version 1.1, November 2015
* System Design Document (SDD) Version 0.3, November 2015
* Requirements Traceability Matrix (RTM) V1.0, November 2015
* OneVA Pharmacy Implementation Risk Log Version 0.1, October 2015

# Items to Be Tested

The OneVA Pharmacy Implementation Master Test Plan covers the functional requirements as included in section 2.6 of the OneVA Pharmacy Implementation RSD. In general, the requirements describe the ability to access the patients’ remote site prescription information in order to refill active prescriptions and create the prescription labels. Also covered is the following:

* Exclusion of prescriptions for controlled substances
* Other current restrictions on refills, such as “too early” and when prescription are suspended or held
* Required refill reports
* Design constraints listed in the OneVA Pharmacy Implementation RSD section 2.3
* Business rules listed in the OneVA Pharmacy Implementation RSD section 2.2

## Test Cases

The ‘Test Cases’ section identifies all tests and expected results. Some items to be tested are covered by one or more test cases. The tests performed must demonstrate the new capabilities developed in the prototype and provide the required functionality while not adversely impacting existing functionality.

Test cases are derived from the three use cases defined in the OneVA Pharmacy Implementation SDD and include testing the current VistA functionality to ensure it is not adversely affected.

The following lists show the test case identifier and a description of each test case. The identifier (e.g., VistA-1\_VO-3.1-1) includes the system designated as the local system in the test (VistA-1\_), the use case on which the test is based (VO-3.1), followed by a number (-1) to give each test case a unique id. A test case identifier can be used to search the test case workbook and test run session logs for specific expected and actual results.

* View Orders (VO) test cases show all local orders and any active, suspended, or held orders on remote systems.
* VistA-1\_VO-3.2-1 View Orders - Local prescriptions only. Patient has prescriptions on the Local system.
* VistA-1\_VO-3.2-2 View Orders - Local prescriptions only. Patient has prescriptions on the Local system and is registered on VistA System 2.
* VistA-1\_VO-3.2-3 View Orders - Local prescriptions only. Patient has prescriptions on the Local system and is registered on VistA System 3.
* VistA-1\_VO-3.2-4 View Orders - Local prescriptions only. Patient has prescriptions on the Local system and is registered on VistA System 2 and VistA System 3.
* VistA-1\_VO-3.2-5 View Orders - Remote prescriptions only. Patient has prescriptions on VistA System 2.
* VistA-1\_VO-3.2-6 View Orders - Remote prescriptions only. Patient has prescriptions on VistA System 3.
* VistA-1\_VO-3.2-7 View Orders - Remote prescriptions only. Patient has prescriptions on VistA System 2 and is registered on VistA System 3.
* VistA-1\_VO-3.2-8 View Orders - Remote prescriptions only. Patient has prescriptions on VistA System 2 and is registered on VistA System 3.
* VistA-1\_VO-3.2-9 View Orders - Remote prescriptions only. Patient has prescriptions on VistA System 2 and VistA System 3.
* VistA-1\_VO-3.2-10 View Orders - Local and remote prescriptions. Patient has prescriptions on the Local system and VistA System 2.
* VistA-1\_VO-3.2-11 View Orders - Local and remote prescriptions. Patient has prescriptions on the Local system and VistA System 3.
* VistA-1\_VO-3.2-12 View Orders - Local and remote prescriptions. Patient has prescriptions on the Local system and VistA System 2 and is registered on VistA System 3.
* VistA-1\_VO-3.2-13 View Orders - Local and remote prescriptions. Patient has prescriptions on the Local system and VistA System 3 and is registered on VistA System 2.
* VistA-1\_VO-3.2-14 View Orders - Local and remote prescriptions. Patient has prescriptions on all three systems.
* VistA-1\_VO-3.2-15 View Orders - No prescriptions. Patient has no Local prescriptions and is not registered on VistA System 2 or VistA System 3.
* VistA-1\_VO-3.2-16 View Orders - No prescriptions. Patient has no Local prescriptions and is registered on VistA System 2 but not on VistA System 3.
* VistA-1\_VO-3.2-17 View Orders - No prescriptions. Patient has no Local prescriptions and is registered on VistA System 3 but not on VistA System 2.
* VistA-1\_VO-3.2-18 View Orders - No prescriptions. Patient has no prescriptions and is registered on both remote systems.

For each of the ‘View Order’ test cases the patient’s Medication Profile screen displays a list of prescriptions as described in the expected results section of the Test Case-Baseline file.

* Exceptions
* VistA-1\_VO-3.2-11-3a View Orders - eMI ESB is not accessible. Patient has prescriptions on all three systems but system component can't be accessed. Error message is displayed.
* VistA-1\_VO-3.2-11-4a View Orders - HDR/CDS is not able. Patient has prescriptions on all three systems but the database can't be accessed. Error message is displayed.

For each ‘View Order Exception’ test case the system displays an error message or warning to describe the exception condition. These or similar test are also run to designate VistA System 2 and VistA System 3 VistA systems as the local system. These additional tests are not listed here but can be found in the Test Results document.

* Dispense Local Order (DLO)
* VistA-1\_DLO-3.3-1 Dispense Local Order - Prescription is refilled. A prescription originating on the local site is dispensed. Patient has local prescriptions only.
* VistA-1\_DLO-3.3-1-R Dispense Local Order - Prescription is refilled. A prescription originating on the local site is dispensed. Patient has local and remote prescriptions.
* VistA-1\_DLO-3.3-1-ALT Dispense Local Order - Partial prescription is filled. A prescription originating on the local site is partially dispensed. Patient has local prescriptions only.
* VistA-1\_DLO-3.3-1-ALTR Dispense Local Order - Partial prescription is filled. A prescription originating on the local site is partially dispensed. Patient has local and remote prescriptions.
* VistA-1\_DLO-3.3-1-PSU Dispense Local Order - Suspended prescription is partially filled.
* VistA-1\_DLO-3.3-1-ERF Dispense Local Order - Prescription is refilled early. A prescription selected for refill before the next refill date is dispensed and is suspended until [*need a description from business rule*].

As a result of the execution of the ‘Dispense Local Order’ test case the patient’s Medication Profile screen displays an updated late refill date and the number of refills remaining is decremented for the prescription selected.

* Exceptions
* VistA-1\_DLO-3.3-1-LCK Dispense Local Order - Unable to lock patient prescription order. A pharmacist cannot select a prescription when open by another pharmacist at the same site. An error message displays.
* VistA-1\_DLO-3.3-1-SUS Dispense Local Order - Suspended prescription is not refilled. A prescription with a status of Suspended is not dispensed. Error message displays.
* VistA-1\_DLO-3.3-1-HLD Dispense Local Order - Held prescription is not refilled. A prescription with a status of Hold is not dispensed. Error message displays.
* VistA-1\_DLO-3.3-1-PHO Dispense Local Order - Held prescription is not partial filled. A prescription with a status of Hold is not dispensed. Error message displays.

For each ‘Dispense Local Order’ exception, the system displays an error message or warning to describe the condition.

* Dispense Remote Order (DRO)
* VistA-1\_DRO-3.4-1 Dispense Remote Order - Prescription is refilled. A prescription originating at another site is dispensed. Patient has remote prescriptions only.
* VistA-1\_DRO-3.4-2 Dispense Remote Order - Prescription is refilled. A prescription originating at another site is dispensed. Patient has local and remote prescriptions.
* VistA-1\_DRO-3.4-1-ALT Dispense Remote Order - Partial prescription is filled. A prescription originating at another site is partially dispensed. Patient has remote prescriptions only.
* VistA-1\_DRO-3.4-2-ALT Dispense Remote Order - Partial prescription is filled. A prescription originating at another site is partially dispensed. Patient has local and remote prescriptions.
* VistA-1\_DRO-3.4-1-PSUS Dispense Remote Order - Suspended prescription is partial filled.

When the ‘Dispense Remote Order’ test case is being executed, the system displays a message to confirm the action. For refills, the patient’s Medication Profile screen displays the updated last refill date and the number of refills remaining is decremented for the prescription refilled. For partial refills, confirming data is found in the Remote Prescription Reports.

* Exceptions
* VistA-1\_DRO-3.4-1-1a Dispense Remote Order - Controlled substance not refilled. A prescription originating on a remote site is not dispensed when the drug is classified as a controlled substance. An error message displays.
* VistA-1\_DRO-3.4-1-2a Dispense Remote Order - eMI ESB is not accessible.
* VistA-1\_DRO-3.4-1-3a Dispense Remote Order - Remote VistA is not accessible.
* VistA-1\_DRO-3.4-1-4a Dispense Remote Order - Remote VistA instance fails the order.
* VistA-1\_DRO-3.4-1-LCK Dispense Remote Order - Prescription is locked by another user. A user has the patient's prescription open on the remote system. An error message displays.
* VistA-1\_DRO-3.4-1-ERF Dispense Remote Order - Prescription is not refilled early; prescription is not suspended. Patient's remote prescription cannot be refilled
* VistA-1\_DRO-3.4-1-ERF Dispense Remote Order - Prescription is not refilled early; prescription is not suspended. Patient's remote prescription cannot be refilled
* VistA-1\_DRO-3.4-1-3a2 Dispense Remote Order - Prescription Manager System does not receive a response from remote VistA systems.
* VistA-1\_DRO-3.4-1-SUS Dispense Remote Order - Suspended prescription is not refilled.
* VistA-1\_DRO-3.4-1-HLD Dispense Remote Order - Held prescription is not refilled.
* VistA-1\_DRO-3.4-1-PHLD Dispense Remote Order - Held prescription is not partial filled.
* VistA-1\_DRO-3.4-1-QCTO Dispense Remote Order - Query connection time out. Unable to connect to CDS within five (5) seconds.
* VistA-1\_DRO-3.4-1-QRTO Dispense Remote Order - Query response time out. No response from CDS within ten (10) seconds.
* VistA-1\_DRO-3.4-1-RCTO Dispense Remote Order - Refill connection time out. Unable to connect to the remote VistA system within five (5) seconds.
* VistA-1\_DRO-3.4-1-RRTO Dispense Remote Order - Refill response time out. No response from the remote Vista system within sixty (60) seconds.
* VistA-1\_DRO-3.4-1-QCTOx Dispense Remote Order - Query connection time out. Unable to connect to CDS within xxxx (n) seconds.
* VistA-1\_DRO-3.4-1-QRTOx Dispense Remote Order - Query response time out. No response from CDS within xxxx (n) seconds.
* VistA-1\_DRO-3.4-1-RCTOx Dispense Remote Order - Refill connection time out. Unable to connect to the remote VistA system within xxxx (n) seconds.
* VistA-1\_DRO-3.4-1-RRTOx Dispense Remote Order - Refill response time out. No response from the remote Vista system within xxxx (n) seconds.

When the ‘Dispense Remote Order’ test case exception logic is executed, the system shows an error message or warning for each exception that describes the condition.

* Remote Prescription Report (RPT) test cases show all combinations of the three reports types and three selection options.
* VistA-1\_RPT-1-D Reports - Prescriptions filled for other facilities by date range.
* VistA-1\_RPT-1-P Reports - Prescriptions filled for other facilities by patient.
* VistA-1\_RPT-1-S Reports - Prescriptions filled for other facilities by site.
* VistA-1\_RPT-2-D Reports - Our prescriptions, filled by other facilities by date range.
* VistA-1\_RPT-2-P Reports - Our prescriptions, filled by other facilities by patient.
* VistA-1\_RPT-2-S Reports - Our prescriptions, filled by other facilities by site.
* VistA-1\_RPT-3-D Reports - All Remote activity by date range.
* VistA-1\_RPT-3-P Reports - All Remote activity by patient.
* VistA-1\_RPT-3-S Reports - All Remote activity by site.
* VistA-2\_RPT-2-D Reports - Our prescriptions, filled by other facilities by date range.
* VistA-2\_RPT-2-P Reports - Our prescriptions, filled by other facilities by patient.
* VistA-2\_RPT-2-S Reports - Our prescriptions, filled by other facilities by site.

The ‘Remote Prescription Report’ test case results included in the Test Results document will contain annotations that describe how report test results confirm specific dispense orders test cases.

## Overview of Test Inclusions

The following components and features and combinations of components and features will be tested as part of the OneVA Pharmacy Implementation project:

* Changes to VistA software to:
* Allow patient prescriptions previously filled at the originating VA Pharmacy to be refilled at another VA Pharmacy in another location.
* Print prescription labels for remote prescription refills.
* Generate and print reports for remote activities.
* The new VAeMI-Middleware components will be tested not only via successful completion of refills but also by specific tests to show when communication among components is unsuccessful.

## Overview of Test Exclusions

The testing exclusion for the OneVA Pharmacy Implementation project includes prescription locking. Before any action is taken on a remote prescription, the prescription is locked. The lock only remains long enough for the routines to file the data, which is generally only a few milliseconds. This prevents a refill or partial fill from occurring at another site for this same patient’s prescription.

# Test Approach

The ‘Test Approach’ section describes the testing strategies used by the OneVA Pharmacy Implementation Team to develop and execute test cases and test scripts.

## How Tests Are Developed

A single test is specified as a test case. A test case describes the interactions between a user and the system and identifies the expected result. A test case typically represents a use case scenario, that is, a single path or sequence of steps through a use case. The most frequent or normal scenario is often referred to as the “happy case”. Other scenarios represent infrequent interactions and results and include error conditions and exceptions.

The test cases for the OneVA Pharmacy Implementation Master Test Plan are derived primarily from the three use cases defined in the SDD and cover all use case scenarios. Additional test cases are included for scenarios to show that current system functions are not adversely impacted and to show variations in the starting conditions.

Test cases are described in detail in the Test Case workbook (TestCases-Baseline.xlsx). Each test case includes the following:

* A test case identifier, name, and description
* Starting conditions and ending conditions
* The name of the person who created the test and the date the test was created
* The name of the person who executed the test and the date the test was executed
* Pass/Fail indication for each step in the test
* User response to the starting conditions or to the result of the previous step
* Expected results of this step
* Explanatory notes, if necessary
* Test Case comments

An example of a test case definition is shown in the [Appendix B](#_Appendix_B_-).

Some test cases are combined into test suites to optimize execution and for inspection of the results. The end state or ending conditions of one test can be the starting state for another. Thus combining test case provides testing efficiencies. Test case execution is automated by creating Visual Basic.NET software modules that implement each test script. These automated test scripts not only allow the tests to be run quicker and potentially more frequently but also eliminate errors caused by performing tests manually.

A test script must start a Telnet session to connect to a VistA system menu option and performs each step in the test case by sending a response to each system prompt and an awaiting a specific system reply. The test script shows these interactions in a Command Prompt window and also captures the interactions, along with test annotations, in a log of the session.

A test script includes code to:

* Create the starting conditions for test scripts when necessary
* Create conditions that cause exceptions
* Create a session log of all user/system interactions
* Add testing annotations to the session log
* Add pass/fail indications to the corresponding steps in the test case worksheet

When the expected results of a test step cannot be programmatically inspected, a step is marked to be checked and the tester will visually inspect the results and update the outcome manually.

All test cases and their results will ultimately be shown in the Test Results document deliverable. A version of the Test Results document can be generated for any version of the software and will be generated as a final regression test. The test case results workbook and the corresponding session logs also provide documentation of the test results.

Test patients and prescription are created using current VistA Fileman and Application Programming Interfaces (APIs) functionality to provide initial conditions for test cases. Multiple patients reflect all the combinations of a patient being registered on one or more VistA systems, with and without prescriptions, to ensure the software provides all require functionality. [Appendix D](#_Test_patients_and) lists patients along with test prescriptions. The Test Results document identifies the patient and prescriptions used for each test case.

## How Tests Are Performed

Test scripts can be run from any Windows computer that supports Telnet sessions and has a version of the .NET Framework installed. When a test script is launched the Telnet session is shown in a Command Prompt window. All the interactions are captured in a session log file. This allows the tester to confirm step completion results are accurately reflected in the test case results worksheet and to inspect those marked to be checked.

Unit testing is performed by software developers as needed to ensure the code modules developed produce the expected results.

Integration testing is performed when code modules are combined to validate the changes produce expected results and to validate other system components were not affected.

Regression testing is performed once all components of the system are assembled into a complete version of the software product deliverable to not only ensure changes implemented for that version works as expected but also to ensure other functionally wasn’t adversely affected.

Test scripts are used for integration and regression testing and can be used for unit testing. All test scripts are executed for regression testing while only some are executed for integration testing to cover the scope of changes made.

To perform a test a Tester enters the Test Run Name, selects the tests to be run from the Run Test Scripts selection window, and clicks the ‘Run’ button.

The following image displays a test script panel where the Tester has selected the option of ‘All’.

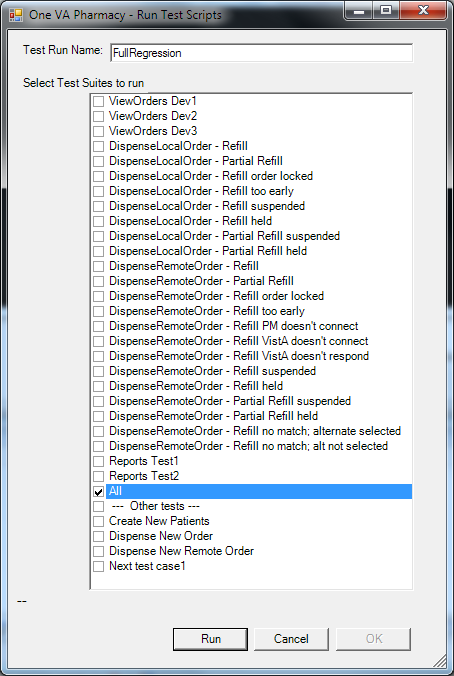


Figure 1: Test Script Panel Example

The Test Run Name provides a short description of the test and is included in the filename of the test case results workbook for easy reference. An example would be:

* TestCases-Results-FullRegression-20140821-032524.xlsx

The following image displays a command Prompt window which shows the test script interaction.

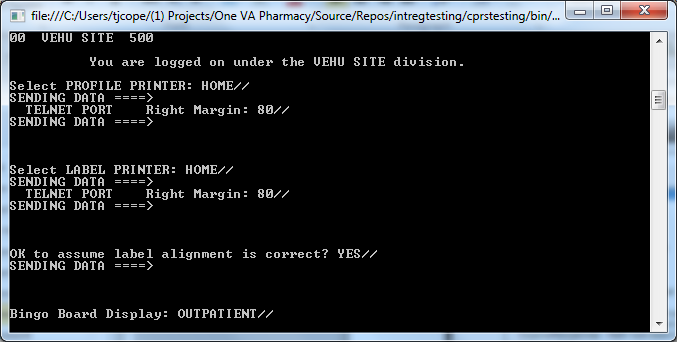


Figure 2: Command Prompt Example

While the Command Prompt window is scrollable, the number of lines that can be displayed are limited, therefore the complete session is typically not viewable. A session log file is created for each test script run for reference.

When all selected tests scripts are complete the selection window displays which scripts were run, skipped, or failed.

The following image displays an example of the message that displays when the test script has completed.

The image displays the test script panel with the message ***Test run completed*** which informs the tester that the script has finished executing.


Figure 3: Test Script Run Completed Example

The updated test cases result workbook file and the corresponding session logs provide the record of the test.

The test case results tables are generated from the test cases results workbook and included in the Test Result document deliverable. An example is shown in the [Appendix C](#_Test_Case_report).

# Testing Methodologies

The ‘Test Methodologies’ section describes the testing strategies used by the OneVA Pharmacy Implementation Team to validate the software and comply with VA, PMAS, ProPath, and Section 508 standards. The section explains how various testing methodologies will be used throughout the project lifecycle. These methodologies include the testing of component builds and continuous development integration testing, Software Quality Assurance (SQA), Unit Functionality Testing (UFT), Enterprise System Engineering (ESE) Enterprise Testing Service (ESE) (Security, Privacy, and Section 508), Performance Testing, Operational Readiness (OR), and Initial Capability (IOC).

## Component & Integration Test

The software developers perform the ‘Component’ testing as part of the continuous cycle of development. The component testing, also known as unit testing, includes the internal technical and functional testing of a module of code. The OneVA Pharmacy Implementation software developer will be responsible to verify that requirements defined in the SDD have been applied to the module while testing. The Developers will perform unit testing and initial integration testing in the development environment while creating and modifying code to ensure the system modules produce the expected results. The Developers will conduct unit testing using the International Business Machine’s (IBMs) Rational Integrated Development Environment (IDE). The IDE is a software application that provides comprehensive facilities including build automation tools and debugger.

The Test Analysts will work with the Developers to perform the final ‘Integration’ testing. They will execute automated test scripts in the development environment before Software Quality Assurance (SQA) Testing begins.

### Component & Integration Test Environment

In order to execute the ‘Component & Integration’ tests a development environment containing three instances of the VistA systems will be made available. For an example, in some test cases and scripts, “VistA System 1 (VistA-1)”, “VistA System 2 (VistA-2)”, and “VistA System 3 (VistA-3)” are used to represent multiple VistA sites. “VistA System 1” is designated the local site for testing purposes and “VistA System 2” and “VistA System 3” are considered remote sites.

The development environment is also equipped with the enterprise messaging capabilities that are provided through the VAs Enterprise Messaging Infrastructure (eMI) enterprise message transport middleware. The use of the middleware allows the connection of the HDR/CDS and remote VistA applications, hiding the details to the communication from the application developers and provides abstracted message endpoints.

Each Developer and Tester’s local computers are configured to allow a Telnet terminal connection to each VistA test instance in the development environment. The Microsoft .Net Framework, used to execute the automated test scripts, must also be installed on the local computer. In addition, each Developer will have access to IBM IDE.

## Software Quality Assurance Testing

The ‘Software Quality Assurance’ (SQA) testing will occur in an environment simulating a construct of the production environment, with all integrated components available. This shall include the following:

* Designated Local VistA site
* Designation of two remote VistA sites
* VAeMI-Middleware Components
* HDR/CDS Connectivity, Availability, & Access

The Quality Assurance (QA) Tester will be responsible for the SQA testing and will execute a suite of approved functional tests to cover regression, access control, usability, Section 508 compliance, interfacing to remote VistA sites, integration with the HDR/CDS, and perform the exercise of executing automated test scripts. The QA Tester will document all defects and report back to the development team for resolution. The Developers will resolve the software defects within the development environment. Once corrected the component integration testing will occur then the SQA process will be repeated until all scripts received a “pass” status.

The OneVA Pharmacy Implementation Test Lead shall be responsible to assure the following steps are executed as part of the SQA testing process:

* Ensure SQA test cases and scripts along with test results are captured and correlated to the appropriate functional requirements in the RTM.
* Ensure for each product build, a test evaluation is created.
* Ensure for each product build tested that SQA testers complete the Vista SQA Checklist.
* Ensure testers update all related RTC tasks they are assigned for Unit Functional Testing.
* Delivery of the following:
  + Updated test cases, test scripts, and results
  + Updated RTM
  + Product build test evaluations
  + Product build VistA SQL checklist

## User Functionality Test

The OneVA Pharmacy Implementation Testing Team will ensure the User Functionality Test (UFT) is conducted. As stated earlier in this document in ‘[Section 2 Items to Be Tested](#_Items_to_Be)’ all functional requirements defined in the RSD will be tested. The Team will coordinate and facilitate all aspects of the UFT by establishing user with test accounts and access to the software.

To prepare for User Functional Testing the OneVA Pharmacy Implementation Team will perform the following:

* Install software in test environment
* Create test patients and prescriptions
* Create user ids for VA testers
* Provide test case scripts workbook to identify all test steps along with setup instructions

During the testing the Team will ensure the following:

* VA testers perform all tests manually and record the result of each test step in the test case scripts workbook.
* VA testers tests the code using approved test cases and test scripts and records that each test has passed or failed according to the documented pass/fail criteria.
* VA testers perform ad-hoc testing, using the test patient data created for the test case scripts and by creating any additional data needed.
* Support for trouble shooting installation and access issues along with any other issues found during testing.
* Correction of Severity 1 or 2 defects discovered during UFT.

Once the testing completes the following will occur:

* Test Lead will collect and analyze UFT test results and ensure any Severity 1 or 2 defects have related Rational Team Concert (RTC) tasks opened, correlated and assigned.
* Developers will ensure any Severity 1 or 2 Defects have related RTC tasks opened, correlated and corrected.
* Delivery of test case and test script results document.
* Delivery of signed ‘Customer Acceptance Form’.

## Enterprise System Engineering

The OneVA Pharmacy Implementation project will support the Enterprise System Engineering (ESE) testing requirements by including in their testing process the Enterprise Testing Service (ETS). The OneVA Pharmacy Implementation Team’s VA Stakeholders determined the following would be acceptable and included in testing:

* Enterprise Testing Service Components:
  + Security
  + Privacy
  + Section 508 Compliance
* Performance Testing
* Operational Readiness (OR)
* Initial Operating Capability (IOC) Evaluation & Testing

### Enterprise Testing Service

Enterprise Testing Service (ETS), an organization within Enterprise Systems Engineering (ESE), works hand-in-hand with Product Development (PD) to provide an independent evaluation of development artifacts and product software. This evaluation helps Office of Information and Technology (OI&T) management minimize risk of schedule delays, cost overrun, poor quality, and software failure. ETS services includes Security, Privacy, and Section 508 compliance and provides:

* Test environments on which software products can be tested
* Independent evaluations of project artifacts and project software

#### Security Testing

The ‘Security Testing’ component for the OneVA Pharmacy Implementation project relies on security compliance in place currently for VistA and the HDR/CDS. Communication between VistA and the HDR/CDS and between multiple VistA sites is provided via the VAeMI-Middleware components, which are VA required and compliant.

#### Privacy Testing

The ‘Privacy Testing’ component for the OneVA Pharmacy Implementation project relies on privacy compliance in place currently for VistA and the HDR/CDS. Communication between VistA and the HDR/CDS and between multiple VistA sites is provided via the VAeMI-Middleware components, which are VA required and compliant.

#### Section 508 Compliance Testing

Section 508 is a Federal law that is part of the Rehabilitation Act of 1973, which established guidelines for technology accessibility. Section 508 requires that any Electronic and Information Technology (E&IT) developed, procured, maintained, or used by Federal departments and agencies must allow Federal employees and members of the public with disabilities access to and use of information and data.

Section 508 provides technical criteria requirements for the following:

* Software applications and operating systems
* Web-based information or applications
* Telecommunications
* Video or multimedia products
* Self-contained closed products
* Desktop and portable computers
* All government agencies are required to comply with Section 508
* All content purchased or used by the Federal government for the creation, conversion, or duplication of information must meet the Section 508 standards

The VA requires all applicable products to comply with Section 508 by submitting the appropriate Section 508 conformance documents for each product. The OneVA Pharmacy Implementation project has incorporated the following in compliance of Section 508:

* The OneVA Pharmacy project is limited to the VistA PSO LM BACKDOOR ORDERS which is a text based, 80-column terminal interface. No fundamental interface changes are being made within VistA. Requirements are met through content changes to the current data screens (e.g., Medication Profile and OP Medication) and to prompts and responses to support remote refills.
* As the OneVA Pharmacy module was designed to run on a system that has a keyboard, product functions are executable from a keyboard where the function itself or the result of performing a function can be discerned textually.
* The OneVA Pharmacy was designed to not disrupt or disable activated features of other products that are identified as accessibility features, where those features are developed and documented according to industry standards. Applications also shall not disrupt or disable activated features of any operating system that are identified as accessibility features where the application programming interface for those accessibility features has been documented by the manufacturer of the operating system and is available to the product developer.
* The OneVA Pharmacy incorporates a well-defined on-screen indication of the current focus as it moves among interactive interface elements, as the input focus changes. The focus programmatically exposes so that assistive technology can track focus and focus changes.
* There is sufficient information about the user interface element including the identity, operation, and state of the element, available to assistive technology. When an image represents a program element, the information conveyed by the image is also be available in text.
* Bitmap images are used to identify controls, status indicators, or other programmatic elements, and the meaning assigned to those images are consistent throughout the application's performance.
* Textual information has been provided through the system functions for displaying text. The minimum information that has been made available includes text content, text input caret location, and text attributes.
* The OneVA Pharmacy software does not override user selected contrast and color selections and other individual display attributes.
* Color-coding has not been used as the only means of conveying information, indicating an action, prompting a response, or distinguishing a visual element.
* OneVA Pharmacy does not use flashing or blinking text, objects, or other elements having a flash or blink frequency greater than 2 Hz and lower than 55 Hz.

The OneVA Pharmacy Implementation Project Team used the Section 508 standard checklists to ensure conformance with Section 508 standards.

## Performance Testing

The ‘Performance Testing’ path taken by the OneVA Pharmacy Implementation project will test specific test cases and the results will be documented as compliant in the performance requirements. The specific performance testing, documented in the OneVA Pharmacy RSD include the following:

* Time out a query connection in five (5) seconds.
* Time out the query response in ten (10) seconds.
* Time out a ‘refill/partial fill’ connection in five (5) seconds.
* Time out a ‘refill/partial fill’ response in sixty (60) seconds.

## Operational Readiness (OR)

The Enterprise System Engineering Enterprise (ESE) Enterprise Testing Service (ETS) may require any of the following tests to be performed by their testing group:

* Requirements Validation Testing
* Integration/Interoperability Testing
* Work Product Review (WPR)
* Test Observation and Validation
* Capacity Planning
* Patient Safety Issue (PSI) Testing

The OneVA Pharmacy Implementation Team will be ready to engage when alerted to any of these planned tests. The Team will be ready for the following tasks:

* Provide ESE ETS any documentation and software builds required for ESE ETS to complete testing
* Incorporate and track ESE ETS test schedules into the OneVA Pharmacy Implantation Project Schedule as a dependency
* Identify and track risks associated with testing related dependencies
* Report as “Yellow” or “Red” any testing dependencies that impact product delivery

## Initial Operating Capability (IOC)Testing

The OneVA Pharmacy Implementation Team will coordinate and facilitate all aspects of the Initial Operating Capability (IOC) testing. Prior to starting IOC Testing, the Team ensures all required documentation is complete and available for review. Once ready, the Team will complete and submit the IOC Entry Request to obtain approval.

The OneVA Pharmacy Implementation Team will respond to all questions and queries from the VHA Release Management in support of the IOC Entry Process.

Once all prerequisites have been met, the IOC test sites install and use the developed solution in their production account for the established timeframe, determined during the planning phase. During the testing phase, the Development Team will provide the following:

* VistA code to test sites via FORUM
* Installation and setup instructions
* Troubleshooting support for installation
* Setup procedures
* User guides and training manuals

The IOC Testers perform tests and identify and report problems to the Development Team. The Development Team documents defects discovered during testing in the defect log. The Team will immediately correct Severity level 1 and 2 defects, perform appropriate tests, then rerelease the software.

The IOC Site Results Evaluator and the IOC Site Representative complete and sign the Initial Operating Capability Site Concurrence Statement.

The Development Team completes and submits the IOC Exit Summary, IOC Site Evaluation Defect Log, and Concurrence Statement to the VHA Release Management Board for approval to exit IOC Testing.

# Testing Techniques

## Test Types

A ‘Test Type’ is a focused test objective and may take place on one or more test levels or phases of testing. The following table contains the test types being deployed for the OneVA Pharmacy Implementation project and the person responsible for the specific test.

Table 3: Test Types

| **Test Types** | **Party Responsible** |
| --- | --- |
| Build verification testing | System Architect |
| Business cycle testing | VA Stakeholders |
| Component integration testing | VistA Developer & System Architect |
| Configuration testing | VistA Developer & System Architect |
| Documentation testing | QA Tester |
| Error analysis testing | Test Lead & QA Tester |
| Installation testing | Test Lead & QA Tester |
| Integration testing | Test Lead & QA Tester |
| Performance testing | VistA Developer |
| Product component testing | VistA Developer & System Architect |
| Section 508 compliance testing | IOC |
| System testing | Test Lead & QA Tester |
| User Functionality Testing | VA Stakeholders |
| User interface testing | Test Lead & QA Tester |

## Productivity and Support Tools

Table 4 describes the tools that will be employed to support the OneVA Pharmacy Implementation Master Test Plan.

Table 4: Tool Category or Types

| Tool Category or Type | Tool Brand Name | Vendor or In-house | Version |
| --- | --- | --- | --- |
| Test Management |  |  |  |
| Defect Tracking | Excel |  |  |
| Test Coverage Monitor or Profiler |  |  |  |
| Performance Testing |  |  |  |
| Configuration Management | FORUM | In-house | 7 |
| Functional Test Automation | Visual Studio VB.NET | Microsoft |  |
| Other |  |  |  |

# Test Criteria

## Process Reviews

The OneVA Pharmacy Implementation Master Test Plan will undergo two separate reviews. They are:

* Peer Review (upon completion of the Master Test Plan)
* Formal Review (after Development Manager approval of the Master Test Plan)

For more information on the reviews associated with testing, see the Product Build, Test Preparation, and Independent Test and Evaluation processes.

## Pass/Fail Criteria

Each test case and test script developed will be designed to “pass” or “fail” a test. All failed test scripts will be logged and tracked and resolution will be made by the Development Team.

## Suspension and Resumption Criteria

Not applicable.

# Test Deliverables

Table 5 lists the test deliverables for the OneVA Pharmacy Implementation project.

Table 5: Test Deliverables

| Test Deliverables | Responsible Party |
| --- | --- |
| Signed Master Test Plan (0004AA) | TJ Cope, Test Lead |
| Peer and User Reviewed and Approved Test Cases/Test Scripts (0004AB) | TJ Cope, Test Lead |
| Testing Related Tasks Entered into RTC (0004AC) | TJ Cope, Test Lead |
| Signed IOC Site Memorandum of Understanding (0004AD) | TJ Cope, Test Lead |
| Risk Analysis and Testing Scope Report (0004AE) | TJ Cope, Test Lead |
| Primary Developer Checklists (0004AF) | Brad Fisher, VistA Developer |
| Secondary Developer Checklists (0004AG) | TBD |
| HP Fortify Static Code Analyzer Scan Results (0004AJ) | Tony Burleson, Developer |
| Product Build for SQA Testing (0004AK) | Brad Fisher, VistA Developer Tony Burleson, Developer |
| Updated Test Cases and Test Scripts and Results (0004AH | TJ Cope, Test Lead |
| Test Case and Test Script Results (0004AL) | TJ Cope, Test Lead |
| Updated Requirements Traceability Matrix (0004AM) | TJ Cope, Test Lead |
| Product Build Test Evaluations (0004AN) | TJ Cope, Test Lead |
| Product Build VistA SQA Checklists (0004AP) | TJ Cope, Test Lead |
| UFT Test Cases and Test Scripts and Results (0004AQ) | TJ Cope, Test Lead |
| Signed Customer Acceptance Form (0004AR) | Cecelia Wray, Project Manager |
| IOC Exit Summary (0004AS) | Cecelia Wray, Project Manager |
| IOC Site Evaluation Defect Log and Concurrence Statement (0004AT) | TJ Cope, Test Lead |

# Test Schedule

The testing schedule is documented in the OneVA Pharmacy Work Breakdown Structure (WBS) Project Plan. Each OneVA Pharmacy Implementation project milestone and milestone due date is available in the WBS. The following table lists the testing milestones and the responsible party.

Table 6: Testing Milestones

| Testing Milestones | Responsible Party |
| --- | --- |
| Project moves into SQA Testing | Brad Fisher, VistA Developer Tony Burleson, Developer |
| SQA Testing complete | TJ Cope, Test Lead |
| Project moves into User Functional Testing | TJ Cope, Test Lead |
| User Functional Testing complete | TJ Cope, Test Lead |
| Project moves into ETS Testing and Operational Readiness Review | Cecelia Wray, Project Manager |
| ETS Testing and ORR complete | Cecelia Wray, Project Manager |
| Project moves into IOC Testing | Cecelia Wray, Project Manager |
| IOC Testing complete | Cecelia Wray, Project Manager |

# Test Environments

A test environment is an environment containing hardware, instrumentation, simulators, software tools, and other support elements needed to conduct a test.

## Test Environment Configurations

The test environment will be a controlled environment in order to avoid the introduction of defects that would alter the expected test results and invalidate the test cases. The goal is to replicate the test environment as-closely-as-possible to production. In order to ensure such an environment, TJ Cope, the OneVA Pharmacy Test Lead will be responsible for maintaining the following test environments:

* cheyl197 – 54791
* cheyl198 – 54795
* cheyl199 - 54796

## Base System Hardware

Table 6 sets forth the system resources for the test effort presented in the OneVA Pharmacy Implementation Master Test Plan. The specific elements of the test system may not be fully understood in early iterations, so this section may be completed over time. The test system should simulate the production environment as closely as possible, scaling down the concurrent access and database size, and so forth, if and where appropriate. Tailor the System Hardware Resources table as required.

Table 7: System Hardware Resources

| Resource | Quantity | Name and Type |
| --- | --- | --- |
| Network or Subnet |  | TBD |
| Server Name |  | TBD |
| Client Test PCs |  |  |
| Include special configuration requirements |  | TBD |
| Test Repository |  |  |
| Network or Subnet |  | TBD |
| Server Name |  | TBD |
| Test Development PCs |  | TBD |

## Base Software Elements in the Test Environments

The following table describes the base software elements that are required in the test environment for the OneVA Pharmacy Implementation Master Test Plan.

Table 8: Software Elements

| Software Element Name | Version | Type and Other Notes |
| --- | --- | --- |
| NT Workstation |  | Operating System |
| Windows 2000 |  | Operating System |
| Network Associates McAfee Virus Checker |  | Virus Detection and Recovery Software |

# Staffing and Training Needs

Table 9 describes the personnel resources needed to plan, prepare, and execute the OneVA Pharmacy Implementation Master Test Plan and the test environments.

Table 9: Staffing Resources

| Testing Task | Quantity of Personnel Needed | Test Process | Duration/ Days |
| --- | --- | --- | --- |
| Create the Master Test Plan | Test Lead and Technical Editor | Test Preparation | 4 weeks |
| Establish the Test Environment | Systems Analyst and VistA Developer | Test Preparation | 8 weeks |
| Perform System Tests |  | Product Build | 4 weeks |

# Risks and Constraints

The OneVA Pharmacy Implementation Risk Log was taken into consideration in the development of the Master Test Plan. The risks identified in the OneVA Pharmacy Master Test Plan can be found in the risk log.

# Test Metrics

Metrics are a system of parameters or methods for quantitative and periodic assessment of a process that is to be measured. Test metrics may include, but are not limited to:

* Number of test cases (pass/fail)
* Percentage of test cases executed
* Number of requirements and percentage tested
* Percentage of test cases resulting in defect detection
* Number of defects attributed to test case/test script creation
* Percentage of defects identified; listed by cause and severity
* Time to re-test

# Attachment A – Approval Signatures

The OneVA Pharmacy Implementation Master Test Plan documents the project’s overall approach to testing and includes:

* Items to be tested, testing strategy & criteria
* Test deliverables & schedule
* Test environments
* Staffing and training needs
* Risks and constraints & Test Metrics

This section is used to document the approval of the OneVA Pharmacy Implementation Master Test Plan during the Formal Review. The review should be ideally conducted face to face where signatures can be obtained ‘live’ during the review however the following forms of approval are acceptable:

1. Physical signatures obtained face to face or via fax

2. Digital signatures tied cryptographically to the signer

3. /es/ in the signature block provided that a separate digitally signed e-mail indicating the signer’s approval is provided and kept with the document

The following members of the governing Integrated Project Team (IPT) are required to sign. Please annotate signature blocks accordingly.

REVIEW DATE:

SCRIBE:

Signed:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Joshua Patterson Date

Integrated Project Team (IPT) Chair

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Michael Valentino Date

Business Sponsor

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Cecelia Wray Date

Project Manager

# Appendix A - Test Type Definitions

| Test Type | Definition |
| --- | --- |
| Access Control Testing | A type of testing that attests that the target-of-test data (or systems) are accessible only to those actors for which they are intended, as defined by use cases. Access Control Testing verifies that access to the system is controlled and that unwanted or unauthorized access is prohibited. This test is implemented and executed on various targets-of-test. |
| Benchmark Testing: | A type of performance testing that compares the performance of new or unknown functionality to a known reference standard (e.g., existing software or measurements). For example, benchmark testing may compare the performance of current systems with the performance of the Linux/Oracle system. |
| Build Verification Testing  (Prerequisite: Smoke Test) | A type of testing performed for each new build, comparing the baseline with the actual object properties in the current build. The output from this test indicates what object properties have changed or don’t meet the requirements. Together with the Smoke test, the Build Verification test may be utilized by projects to determine if additional functional testing is appropriate for a given build or if a build is ready for production. |
| Business Cycle Testing | A type of testing that focuses upon activities and transactions performed end to end over time. This test type executes the functionality associated with a period of time (e.g., one-week, month, or year). These tests include all daily, weekly, and monthly cycles, and events that are date-sensitive (e.g., end of the month management reports, monthly reports, quarterly reports, and year-end reports). |
| Capacity Testing | [Capacity](http://www.geekinterview.com/question_details/48768) testing occurs when you simulate the number of users in order to stress an application's hardware and/or network infrastructure. Capacity testing is done to determine the capacity (CPU, Data Storage, LAN, WAN, etc.) of the system and/or network under test. |
| Compliance Testing | A type of testing that verifies that a collection of software and hardware fulfills given specifications. For example, these tests will minimally include: “core specifications for hosting – ver.1.5-draft 3.doc”, Section 508 of The Rehabilitation Act Amendments of 1998, Race and Ethnicity Test, and VA Directive 6102 Compliance. It does not exclude any other tests that may also come up. |
| Component Integration Testing | Testing performed to expose defects in the interfaces and interaction between integrated components as well as verifying installation instructions. |
| Configuration Testing | A type of testing concerned with checking the programs compatibility with as many possible configurations of hardware and system software. In most production environments, the particular hardware specifications for the client workstations, network connections, and database servers vary. Client workstations may have different software loaded, for example, applications, drivers, and so on hand, at any one time; many different combinations may be active using different resources. The goal of the configuration test is finding a hardware combination that should be, but is not, compatible with the program. |
| Contention Testing | A type of performance testing that executes tests that cause the application to fail with regard to actual or simulated concurrency. Contention testing identifies failures associated with locking, deadlock, live lock, starvation, race conditions, priority inversion, data loss, loss of memory, and lack of thread safety in shared software components or data. |
| Data and Database Integrity Testing | A type of testing that verifies that data is being stored by the system in a manner where the data is not compromised by the initial storage, updating, restoration, or retrieval processing. This type of testing is intended to uncover design flaws that may result in data corruption, unauthorized data access, lack of data integrity across multiple tables, and lack of adequate transaction performance. The databases, data files, and the database or data file processes should be tested as a subsystem within the application. |
| Documentation Testing | Documentation testing is a type of testing that should validate the information contained within the software documentation set for the following qualities: compliance to accepted standards and conventions, accuracy, completeness, and usability. The documentation testing should verify that all of the required information is provided in order for the appropriate user to be able to properly install, implement, operate, and maintain the software application. The current VistA documentation set can consist of any of the following manual types:  Release Notes, Installation Guide, User Manuals, Technical Manual, and Security Guide. |
| Error Analysis Testing | This type of testing verifies that the application checks for input, detects invalid data, and prevents invalid data from being entered into the application. This type of testing also includes the verification of error logs and error messages that are displayed to the user. |
| Exploratory Testing | A technique for testing computer software that requires minimal planning and tolerates limited documentation for the target-of-test in advance of test execution, relying on the skill and knowledge of the tester and feedback from test results to guide the ongoing test effort. Exploratory testing is often conducted in short sessions in which feedback gained from one session is used to dynamically plan subsequent sessions. |
| Failover Testing | A type of testing test that ensures an alternate or backup system properly “takes over” (i.e., a backup system functions when the primary system fails). Failover Testing also tests that a system continually runs when the failover occurs, and that the failover happens without any loss of data or transactions. Failover Testing should be combined with Recovery Testing. |
| Installation Testing | A type of testing that verifies that the application or system installs as intended on different hardware and software configurations, and under different conditions (e.g., a new installation, an upgrade, and a complete or custom installation). Installation testing may also measure the ease with which an application or system can be successfully installed, typically measured in terms of the average amount of person-hours required for a trained operator or hardware engineer to perform the installation. Part of this installation test is to perform an uninstall. As a result of this uninstall, the system, application and database should return to the state prior to the install. |
| Integration Testing | An incremental series of tests of combinations or sub-assemblies of selected components in an overall system. Integration testing is incremental in a successively larger and more complex combinations of components tested in sequence, proceeding from the unit level (0% integration) to eventually the full system test (100% integration). |
| Load Testing | A performance test that subjects the system to varying workloads in order to measure and evaluate the performance behaviors and abilities of the system to continue to function properly under these different workloads. Load testing determines and ensures that the system functions properly beyond the expected maximum workload. Additionally, load testing evaluates the performance characteristics (e.g., response times, transaction rates, and other time-sensitive issues). |
| Migration Testing | A type of testing that follows standard VistA and HeV-VistA operating procedures and loads the latest .jar version onto a live copy of VistA and HeV-VistA. The following are examples of the types of tests that can be performed as part of migration testing:   * Data conversion has been completed * Data tables are successfully created * Parallel test for confirmation of data integrity * Review output report, before and after migration, to confirm data integrity * Run equivalent process, before and after migration |
| Multi-Divisional Testing | A type of testing that ensures that all applications will operate in a multi-division or multi-site environment recognizing that an enterprise perspective while fully supporting local health care delivery. |
| Parallel Testing | The same internal processes are run on the existing system and the new system. The existing system is considered the “gold standard”, unless proven otherwise. The feedback (expected results, defined time limits, data extracts, etc.) from processes from the new system are compared to the existing system. Parallel testing is performed before the new system is put into a production environment. |
| Performance Monitoring Testing | Performance profiling assesses how a system is spending its time and consuming resources. This type of performance testing optimizes the performance of a system by measuring how much time and resources the system is spending in each function. These tests identify performance limitations in the code and specify which sections of the code would benefit most from optimization work. The goal of performance profiling is to optimize the feature and application performance. |
| Performance Testing | Performance Testing assesses how a system is spending its time and consuming resources. Performance testing optimizes a system by measuring how much time and resources the system is spending in each function. These tests identify performance limitations in the code and specify which sections of the code would benefit most from optimization work. Performance testing may be further refined by the use of specific types of performance tests, such as, benchmark test, load test, stress test, performance monitoring test, and contention test. |
| Performance – Benchmark Testing | A type of performance testing that compares the performance of new or unknown functionality to a known reference standard (e.g., existing software or measurements). For example, benchmark testing may compare the performance of current systems with the performance of the Linux/Oracle system. |
| Performance – Contention Testing | A type of performance testing that executes tests that cause the application to fail with regard to actual or simulated concurrency. Contention testing identifies failures associated with locking, deadlock, live lock, starvation, race conditions, priority inversion, data loss, loss of memory, and lack of thread safety in shared software components or data. |
| Performance – Endurance Testing | Endurance testing, also known as Soak testing, is usually done to determine if the system can sustain the continuous expected load. During soak tests, memory utilization is monitored to detect potential leaks. |
| Performance – Load Testing | A performance test that subjects the system to varying workloads in order to measure and evaluate the performance behaviors and abilities of the system to continue to function properly under these different workloads. Load testing determines and ensures that the system functions properly beyond the expected maximum workload. Additionally, load testing evaluates the performance characteristics (e.g., response times, transaction rates, and other time-sensitive issues). |
| Performance - Profiling Testing | Performance profiling assesses how a system is spending its time and consuming resources. This type of performance testing optimizes the performance of a system by measuring how much time and resources the system is spending in each function. These tests identify performance limitations in the code and specify which sections of the code would benefit most from optimization work. The goal of performance profiling is to optimize the feature and application performance. |
| Performance – Spike Testing | A performance test in which an application is tested with sudden increment and decrements in the load. The focus is on system behavior during dramatic changes in load. |
| Privacy Testing | A type of testing that ensures that (1) veteran and employee data are adequately protected and (2) systems and applications comply with the Privacy and Security Rule provisions of the Health Insurance Portability and Accountability Act (HIPAA). |
| Product Component Testing | Product Component Testing (aka Unit Testing) is the internal technical and functional testing of a module/component of code. Product Component Testing verifies that the requirements defined in the detail design specification have been successfully applied to the module/component under test. |
| Recovery Testing | A type of testing that causes an application or system to fail in a controlled environment. Recovery processes are invoked while an application or system is monitored. Recovery testing verifies that application or system, and data recovery is achieved. Recovery Testing should be combined with Failover Testing. |
| Regression Test | A type of testing that validates existing functionality still performs as expected when new functionality is introduced into the system under test. |
| Risk Based Testing | A type of testing based on a defined list of project risks. It is designed to explore and/or uncover potential system failures by using the list of risks to select and prioritize testing. |
| Section 508 Compliance Testing | A type of test that (1) ensures that persons with disabilities have access to and are able to interact with graphical user interfaces and (2) verifies that the application or system meets the specified Section 508 Compliance standards. |
| Security Testing | A type of test that validates the security requirements and to ensure readiness for the independent testing performed by the Security Assessment Team as used by the Assessment and Authorization Process. |
| Smoke Test | A type of testing that ensures that an application or system is stable enough to enter testing in the currently active test phase. It is usually a subset of the overall set of tests, preferably automated, that touches parts of the system in at least a cursory way. |
| Stress Testing | A performance test implemented and executed to understand how a system fails due to conditions at the boundary, or outside of, the expected tolerances. This failure typically involves low resources or competition for resources. Low resource conditions reveal how the target-of-test fails that is not apparent under normal conditions. Other defects might result from competition for shared resources (e.g., database locks or network bandwidth), although some of these tests are usually addressed under functional and load testing. Stress Testing verifies the acceptability of the systems performance behavior when abnormal or extreme conditions are encountered (e.g., diminished resources or extremely high number of users). |
| System Testing | System testing is the testing of all parts of an integrated system, including interfaces to external systems. Both functional and structural types of testing are performed to verify that the system performance, operation and functionality are sound. End to end testing with all interfacing systems is the ultimate version. |
| Usability Testing | Usability testing identifies problems in the ease-of-use and ease-of-learning of a product. Usability tests may focus upon, and are not limited to: human factors, aesthetics, consistency in the user interface, online and context-sensitive help, wizards and agents, user documentation. |
| User Functionality Test | User Functionality Test (UAT) is a type of Acceptance Test that involves end-users testing the functionality of the application using test data in a controlled test environment. |
| User Interface Testing | User-interface (UI) testing exercises the user interfaces to ensure that the interfaces follow accepted standards and meet requirements. User-interface testing is often referred to as GUI testing. UI testing provides tools and services for driving the user interface of an application from a test. |

# Appendix B - Test Case Defined, Logged, & Reported

The following image is an example of a test case as specified in the Test Cases worksheet in the “TestCases-Baseline.xlsx” workbook.

| Test Case Example |
| --- |
| The appendix displays an image of a test case example. |

The following image displays additional information for the same test case but includes the test results.

| Test Case Example |
| --- |
| The image displays an example of a test case |

When the last step (row 19) of a test script is executed the “CHK” value is manually changed to “Yes” and the Test Result value (row 15) will change to “Pass” as displayed in the following image.

| Test Case Example |
| --- |
| The image displays an example of a test case. |

# Appendix C - Test Case Report Table

The following is an example of a test case report table as generated from TestCases-Result worksheet for inclusion in the Test Results document:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test Case ID:**  VistA-1\_VO-3.1-1 | | **Test Case:** View Orders - Patient has local prescriptions only - Patient is registered and has prescriptions on Dev1 only | | **Created By:**  TJ Cope | | | | **Date Created:**  04/01/2013 |
|  | | | **Test Script:** ViewOrders-TS-GOLDDEV1 **Tester:** TJ Cope | **Date Tested:** 7/21/2014 2:46:14 PM | | | | **Results (Pass or Fail):**  Fail |
| **Actors:** | | | Pharmacist | | | | | |
| **Pre-Conditions:** | | | Patient 111-99-0201 has RX #s  Dev1 - Active  -------------------------------------ACTIVE-----------  1 501276$ TRIAMCINOLONE 75MCG 240D  VistA System 2 - not registered  VistA System 3 - not registered  "Select PATIENT NAME:" prompt is displayed | | | | | |
| **Steps** | **Actions** | | **Expected Results** | | **Pass** | **Fail** | **Note** | |
| 1 | 1. Enter patient SSN: 111990201 | | Patient Name, DOB, SSN, etc. displays  Checking remote systems message displays  "Press Return to continue: " prompt displays. | | Yes |  |  | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 2 | Type: [Enter] | "RX PATIENT STATUS: OPT NSC// " prompt displays. | Yes |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 3 | Type: [Enter] | page 1 Patient Information screen displays  "Select Action: Next Screen//" prompt displays. | Yes |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 4 | Type: [Enter] | page 2 Patient Information screen displays  "Select Action: Quit//" prompt displays. | Yes |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| End | Type: [Enter] | Medication Profile screen displays  -------------------------------------ACTIVE-----------  1 501276$ TRIAMCINOLONE 75MCG 240D ORAL  . | CHK |  |  |

|  |  |
| --- | --- |
| **Post Conditions:** |  |
| **Comments:** |  |

# Appendix D - Test Patients and Prescriptions

| VistA System ------ | ISSUE LAST REF DAY  # RX # DRUG QTY ST DATE FILL REM SUP  --------------------------------------------------------------------------------- |
| --- | --- |
|  |  |
|  | Patient Name: INTREGVOT,OXX SSN: 111880201 |
| VistA-1 | 1 501113$ TRIAMCINOLONE 75MCG 240D ORAL INHL 2 A 06-11 06-11 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,ROX SSN: 111880202 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | 1 501111$ AMOXICILLIN 250/CLAV K 125MG TAB 21 A> 06-11 06-11 1 7 |
| VistA-2 | 2 501112$ IBUPROFEN 200MG TAB 240 A> 06-11 06-11 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,RXO SSN: 111880203 |
| VistA-1 | <No local prescriptions found.> |
| VistA-3 | 1 501111$ PREDNISONE 1MG TAB 60 A> 05-01 05-01 9 30 |
|  |  |
|  | Patient Name: INTREGVOT,ROR SSN: 111880204 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | 1 501113$ ACETAMINOPHEN 325MG TAB 240 A> 07-23 07-23 5 30 |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,RRO SSN: 111880205 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | 1 501113$ NAPROXEN 250MG TAB 120 A> 06-03 06-04 11 30 |
| VistA-3 | 2 501112$ TRIAMCINOLONE 75MCG 240D ORAL INHL 2 A 06-03 06-04 3 30 |
|  |  |
|  | Patient Name: INTREGVOT,ROO SSN: 111880206 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | 1 501114$ PSEUDOEPHEDRINE HCL 30MG TAB 120 A> 05-27 05-27 5 60 |
| VistA-2 | 2 501124$ ASPIRIN 325MG BUFFERED TAB 360 H> 07-25 - 5 60 |
| VistA-3 | 1 501114$ RAMIPRIL 5MG CAP 60 A> 07-23 07-23 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,OOX SSN: 111880207 |
| VistA-1 | 1 501114$ HYDROCHLOROTHIAZIDE 25MG TAB 60 A> 06-11 06-11 5 60 |
| VistA-1 | 2 501115$ OMEPRAZOLE 20MG EC CAP 30 A> 06-11 06-11 3 30 |
| VistA-1 | 3 501116$ RAMIPRIL 5MG CAP 30 A> 06-23 06-24 7 30 |
| VistA-2 | 1 501115$ AMOXICILLIN 250/CLAV K 62.5MG/5ML SUSP E> 06-23 06-23 0 7 |
|  | Qty: 200 |
| VistA-2 | 2 501116$ IBUPROFEN 200MG TAB 360 A> 06-25 06-25 3 90 |
|  | Patient Name: INTREGVOT,OXO SSN: 111880208 |
| VistA-1 | 1 501125$ ASPIRIN 325MG BUFFERED TAB 120 A> 06-23 07-25 0 30 |
| VistA-1 | 2 501117$ ATORVASTATIN CALCIUM 10MG TAB 60 A> 06-23 06-23 5 60 |
| VistA-3 | 1 501115$ VERAPAMIL HCL 120MG SA CAP 30 A> 06-02 06-02 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,OOR SSN: 111880209 |
| VistA-1 | 1 501118$ HYDROCHLOROTHIAZIDE 25MG TAB 90 A> 05-27 05-27 3 90 |
| VistA-1 | 2 501119$ OMEPRAZOLE 20MG EC CAP 90 A> 05-27 05-27 3 90 |
| VistA-1 | 3 501126$ IBUPROFEN 200MG TAB 120 DC>07-25 07-25 11 30 |
| VistA-2 | 1 501118$ AMOXICILLIN 250/CLAV K 125MG TAB 28 A> 07-23 07-23 1 14 |
| VistA-2 | 2 501119$ HYDROCORTISONE 1% CREAM 20 A 07-23 07-23 2 30 |
| VistA-2 | 3 501117$ IBUPROFEN 200MG TAB 240 A> 07-23 07-23 11 30 |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,ORO SSN: 111880210 |
| VistA-1 | 1 501120$ ATORVASTATIN CALCIUM 10MG TAB 60 A> 06-20 06-20 5 60 |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | 1 501116$ VERAPAMIL HCL 120MG SA CAP 60 A> 07-23 07-23 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,OOO SSN: 111880211 |
| VistA-1 | 1 501112$ TRIAMCINOLONE 75MCG 240D ORAL INHL 2 A 07-23 07-23 11 30 |
| VistA-1 | 1 501123$ ACETAMINOPHEN 325MG TAB 240 S> 07-25 08-14 5 30 |
| VistA-2 | 2 501109$ NAPROXEN 250MG TAB 60 A> 05-16 05-16 11 30 |
| VistA-2 | 3 501110$ RANITIDINE HCL 25MG EFFER TAB 60 A 05-16 05-16 6 30 |
| VistA-2 | 1 501122$ IBUPROFEN 200MG TAB 120 S> 07-14 08-03 3 30 |
| VistA-3 | 2 501110$ PREDNISONE 1MG TAB 120 A> 06-23 06-23 10 30 |
|  |  |
|  | Patient Name: INTREGVOT,ORX SSN: 111880212 |
| VistA-1 | 1 501120$ ATORVASTATIN CALCIUM 10MG TAB 60 A> 06-20 06-20 5 60 |
| VistA-2 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,OXR SSN: 111880213 |
| VistA-1 | 1 501122$ VERAPAMIL HCL 120MG SA CAP 60 A> 07-23 07-23 7 30 |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,ORR SSN: 111880214 |
| VistA-1 | 1 501123$ IBUPROFEN 800MG TAB 60 A> 05-27 05-27 6 30 |
| VistA-1 | 2 501124$ PSEUDOEPHEDRINE HCL 30MG TAB 60 A> 05-27 05-27 5 30 |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | <No local prescriptions found.> |
|  | Patient Name: INTREGVOT,RXX SSN: 111880215 |
| VistA-1 | This patient has no prescriptions |
|  |  |
|  | Patient Name: INTREGVOT,RRX SSN: 111880216 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,RXR SSN: 111880217 |
| VistA-1 | <No local prescriptions found.> |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,RRR SSN: 111880218 |
| VistA-1 | <No local prescriptions found.> |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,XRX SSN: 111880219 |
| VistA-2 | This patient has no prescriptions |
|  |  |
|  | Patient Name: INTREGVOT,XXR SSN: 111880220 |
| VistA-3 | This patient has no prescriptions |
|  |  |
|  | Patient Name: INTREGVOT,XOX SSN: 111880221 |
| VistA-2 | 1 501120$ PSEUDOEPHEDRINE HCL 30MG TAB 120 A> 06-11 06-11 5 60 |
|  |  |
|  | Patient Name: INTREGVOT,XXO SSN: 111880222 |
| VistA-3 | 1 501117$ PREDNISONE 1MG TAB 120 A> 06-02 06-26 11 30 |
|  |  |
|  | Patient Name: INTREGVOT,XRR SSN: 111880223 |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,XOR SSN: 111880224 |
| VistA-2 | 1 501121$ AMOXICILLIN 250/CLAV K 125MG TAB 14 A> 07-23 07-23 0 7 |
| VistA-3 | <No local prescriptions found.> |
|  |  |
|  | Patient Name: INTREGVOT,XRO SSN: 111880225 |
| VistA-2 | <No local prescriptions found.> |
| VistA-3 | 1 501119$ HYDROCHLOROTHIAZIDE 25MG TAB 90 A> 05-27 05-27 3 90 |
| VistA-3 | 2 501118$ OMEPRAZOLE 20MG EC CAP 60 A> 05-27 05-27 5 60 |
|  | Patient Name: INTREGVOT,XOO SSN: 111880226 |
| VistA-2 | 1 501122$ PSEUDOEPHEDRINE HCL 30MG TAB 120 A> 05-27 05-28 5 60 |
| VistA-3 | 1 501120$ NAPROXEN 250MG TAB 120 A> 06-03 06-03 11 30 |
| VistA-3 | 2 501121$ TRIAMCINOLONE 75MCG 240D ORAL INHL 2 A 06-03 06-03 11 30 |
|  |  |
|  | Patient Name: CLARK,PETER SSN: 111000480 |
| VistA-1 | 1 501146$ ASPIRIN 25MG/DIPYRIDAMOLE 200MG SA CAP A> 03-16 03-16 9 30 |
| VistA-1 | Qty: 90 |
| VistA-1 | 2 501150$ IBUPROFEN 100MG/5ML SUSP 90 A> 03-16 03-16 11 30 |
| VistA-2 | 3 501218 NAPROXEN 125MG/5ML SUSP 90 A 03-16 03-16 11 30 |
| VistA-2 | 4 501219 ACETAMINOPHEN 100MG/ML (SF) ORAL SU 90 A 03-16 03-16 11 30 |
| VistA-2 | 5 501220 AMOXICILLIN 250/CLAV K 125MG TAB 90 A 03-16 08-25 10 30 |
| VistA-3 | <No active prescriptions found.> |
|  |  |
|  | Patient Name: GRIFFEY,JOE SSN: 111000481 |
| VistA-1 | 1 501147$ ASPIRIN 25MG/DIPYRIDAMOLE 200MG SA CAP A> 03-16 03-16 11 30 |
| VistA-1 | Qty: 90 |
| VistA-1 | 2 501151$ IBUPROFEN 100MG/5ML SUSP 90 A> 03-16 03-16 11 30 |
| VistA-2 | 1 501222 ACETAMINOPHEN 100MG/ML (SF) ORAL SU 90 A 03-16 03-16 11 30 |
| VistA-2 | 2 501223 AMOXICILLIN 250/CLAV K 125MG TAB 90 A 03-16 03-16 11 30 |
| VistA-2 | 3 501221 NAPROXEN 125MG/5ML SUSP 90 A 03-16 03-16 11 30 |
| VistA-3 | 1 501151 FENOFIBRATE 150MG CAP 240 S 03-17 09-14 9 30 |
| VistA-3 | 2 501150 PSEUDOEPHEDRINE 60MG S.T. 240 A 03-17 03-17 11 30 |
| VistA-3 | 3 501152 TETRACYCLINE HCL 250MG CAP 240 H 03-17 - 11 30 |