keynote

DeviceAnywhere

The #1 Mobile Testing Platform

DeviceAnywhere Enterprise Monitoring

Best Practice Workflow

Release 6.0

DeviceAnywhere Enterprise Monitoring 6.0

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Contents

About This Document

This document describes key concepts and the best practice workflow for creating and scheduling scripts to monitor functionality and applications on real mobile devices using Keynote's DeviceAnywhere Enterprise Monitoring (DAE Monitoring).

DAE Monitoring is an enterprise-class service for monitoring mobile network and application availability and performance on smart devices. With DAE Monitoring, production support teams can easily write/record monitor scripts and schedule them at any frequency on real, live devices. You can define custom thresholds for acceptable performance and the responses that are triggered when policies are violated. Policy violation responses include customizable, instant email or SNMP alerts (with up to three escalation paths) and adjusted monitor frequency.

The Web-based DAE Monitoring Portal is the central repository for run-time data and results of monitor executions. The Portal provides a real-time dashboard view of currently running monitors and live device screens as scripts are executed on them. Users can also view historical monitor data such as a list of all monitor executions, success rates for individual monitors, error reports, trend charts, and detailed results with screenshots for individual script runs.

Document Outline

In this document:

Prerequisites and Product Overview describes DAE Monitoring prerequisites and features. It also introduces DeviceAnywhere Studio client software and the DAE Monitoring Portal.

Concepts and Basic Workflow introduces key concepts and script building blocks and describes how they relate to each other in an overview of the DAE Monitoring workflow.

Scripting Workflow: Round One describes in detail the steps and associated best practices in the first pass of the DAE Monitoring workflow.

Scripting Workflow: Round Two describes in detail the steps and associated best practices in the second pass of the DAE Monitoring Workflow.

Typographical Conventions

The table below describes the typographical conventions used in Keynote DeviceAnywhere documentation.

Style	Element	Examples
Blue	Links and email addresses	http://www.keynote.com The Document Outline section describes the structure of this manual.
Bold	User interface elements such as menu items	Click **My Devices** in DeviceAnywhere Studio.
`Monospace`	Commands, code output, filenames, directories	Right-click the project's `test cases` directory.
`Monospace bold`	User input	In a command window, type **`adb devices`**.
Italic	Document titles and emphasis	Refer to the *DeviceAnywhere Enterprise Automation User Guide* to learn how to script.

Contacting Support

If you have any comments or suggestions regarding this document, contact Keynote Support. For inquiries about DeviceAnywhere product demonstrations and consulting services, contact your Keynote Solutions Consultant.

Customers can find additional support information at http://support.keynote.com or 1-888-KEY-SYST (539-7978).

Additional Documentation

You can find additional information at http://www.keynotedeviceanywhere.com/monitoring-documentation.html. This includes the following documents:

- *DAE Monitoring Release Notes*
- *DAE Monitoring Portal Guide*

You can also find these documents on interacting with devices and working in the visual scripting environment in DeviceAnywhere Studio:

- *DAE Automation User Guide*—refer to chapters on Projects, Working with Commands, Actions, States, Test Cases, and the Command Reference.

  NOTE This manual deals primarily with using DeviceAnywhere Enterprise Automation for pre-deployment testing of mobile applications, services, and devices.

- *DAE Guide to Image Matching*
- *DAE Guide to Text Matching*
- *DAE Interactive User Guide*—learn about device interaction and process improvement and collaboration tools available in DeviceAnywhere Studio.
- *Tips for Interacting with Devices*
- *DAE Private System Installation Guide*—relevant for standalone DAE Monitoring systems.

You can also access documentation from the **Help** menu in DeviceAnywhere Studio.

1 Prerequisites and Product Overview

Keynote DeviceAnywhere Enterprise Monitoring enables you to automate the monitoring your mobile applications, service, and content on real, live mobile devices.

DAE Monitoring is accessed as a module from the DeviceAnywhere Studio client software.

This chapter describes prerequisites for using DAE Monitoring, product features, and benefits and includes a brief tour of product components.

1.1 Prerequisites

This document assumes that you are familiar with interacting with devices in the DeviceAnywhere Studio client application. It also assumes that you are familiar with working with scripting commands in DeviceAnywhere Studio's visual scripting environment. Please refer to the *DAE Automation User Guide* for detailed instructions on working in the visual scripting environment.

To use DAE Monitoring, you require the following:

- Mobile devices (smart devices or feature phones) connected to DeviceAnywhere Enterprise infrastructure
- DeviceAnywhere Studio client software, pointing to a fully operational and networked DeviceAnywhere Enterprise environment (including Ensemble Server, Access Server, SQL Server, LiveMonitor Server, and other components)—see System Requirements for DeviceAnywhere Studio below.
- User credentials in your customer account enabling you to log in to DeviceAnywhere Studio and the DAE Monitoring Portal—if you require credentials, please contact your system administrator.
- A license for DAE Monitoring

NOTES Components of the DeviceAnywhere test environment require a network connection to communicate with each other. DeviceAnywhere Studio must be able to communicate with other infrastructure components, whether hosted or standalone behind your corporate firewall.

Installation requirements for the complete DeviceAnywhere test environment are detailed in the *DeviceAnywhere Private System Installation Guide*.

1.1.1 System Requirements for DeviceAnywhere Studio

Minimum system requirements are as follows:

- 2 GHz dual-core processor (Pentium 4 or higher)
- 2 GB RAM
- At least 10 GB available hard disk space
- Monitor with at least 1600x900 screen resolution
- Optional: Audio card for sound input/output
- Supported operating systems: Windows XP SP2, Windows Server 2003, Windows 7, Windows Server 2008, Mac OS

NOTE Both 32- and 64-bit processing are supported on Windows.

JDK v1.5+ must be installed for Mac OS.

1.2 Features

With DAE Monitoring, you can:

- Automate the monitoring of any functionality or application across all platforms and device models.
- Work with real smart devices or feature phones for real-time interaction and display of device and application behavior on live networks.
- Access devices from any location.
- Measure performance of overall monitor scripts as well as of key transactions within the script.
- Define custom thresholds for acceptable performance for monitors and transactions—failure responses include sending out alerts and adjusting monitor frequency.
- Avail of a visual scripting interface with drag and drop commands or program in Java in DeviceAnywhere Studio or an IDE of your choice.
- Run monitors 24x7 at any frequency for continuous monitoring of performance and availability.
- Schedule monitors to run only on specific days of the week or hours of the day.
- Execute tests ad hoc from DeviceAnywhere Studio for immediate validation.
- Receive customized alerts (with up to three levels of escalation) of performance violations and incident resolution.
- Set up maintenance windows during which monitors are executed but there are no escalations and alerts are therefore suppressed.
- View real-time monitor status and live device screens during execution on Web-based dashboard.
- View a list of all monitor executions, success rates, error reports, post-run trend charts, and detailed results for individual script runs complete with device screenshots in Web Portal.
- Define reference points for script verification based on pixel-to-pixel image matching, text recognition, or web elements.
- Use parameters and variables to implement complex script logic (data variations, loops, branches).
- Define multiple-device tests (e.g., messaging, chat).

1.3 Benefits

DAE Monitoring combines the convenience of 24x7 automated monitoring with the accuracy of real, live devices (as opposed to emulators and simulators) and enables you to:

- Measure from the point of view of a real user, using real devices on live networks.
- Generate accurate, repeatable, and reportable results from automated monitor scripts.
- Make devices available for in-network testing to local as well as remote employees.
- Accurately define expected results (in terms of device screen images, text, or audio from devices) when building test scripts.

- Define scripts in terms of modular components that can be reused across devices and platforms.
- Generate meaningful comparative data by reusing transaction settings to measure the same interactions across different monitors, e.g., opening a Web page on different browsers or on different devices.
- Reuse alerts across different monitor or transaction polices, e.g., use the same alert for a level 2 violation of different transaction policies.
- View and manage your monitoring results in a central location, accessible over a network connection.
- Use test results and charting tools in the portal to determine crucial data such as times of day when a service is not available, how long it takes for content to be downloaded, and whether content appears exactly as it should.
- Use portal data to aid immediate incident tracking as well as mid- to long-term trend analysis.

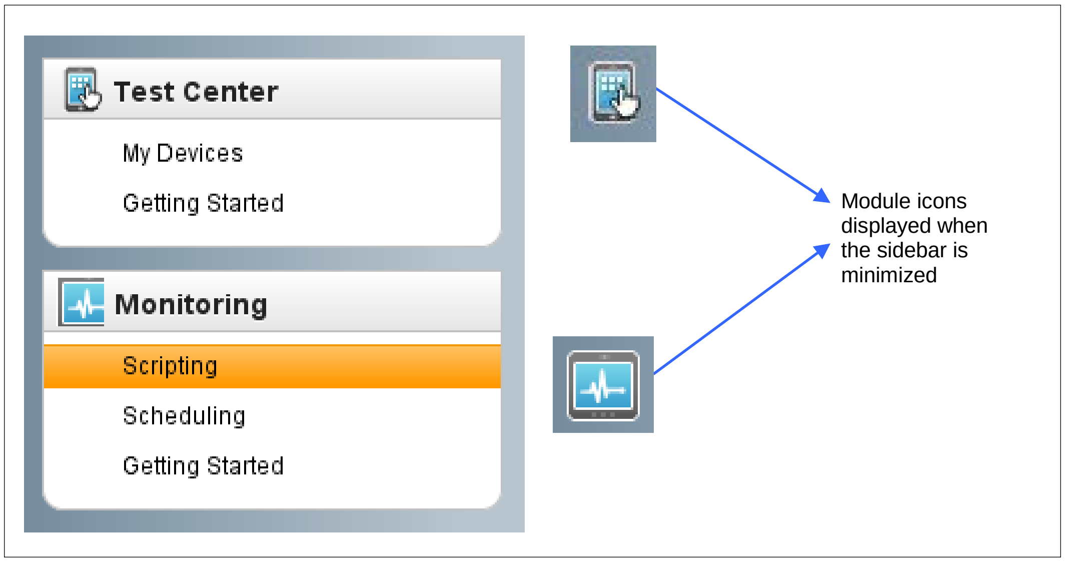
1.4 Product Components

This section describes the components of DAE Monitoring.

1.4.1 DeviceAnywhere Studio Modules

The DeviceAnywhere Studio client application is the primary interface for interacting with devices and scripting and scheduling monitors. DAE Monitoring includes the Monitoring and Test Center modules, or views, which you can access from the application sidebar.

Figure 1-1 DeviceAnywhere Studio Sidebar—Module List and Icons



NOTE You also have access to **Links** for the DAE Monitoring Portal and for reporting an issue to Keynote support.

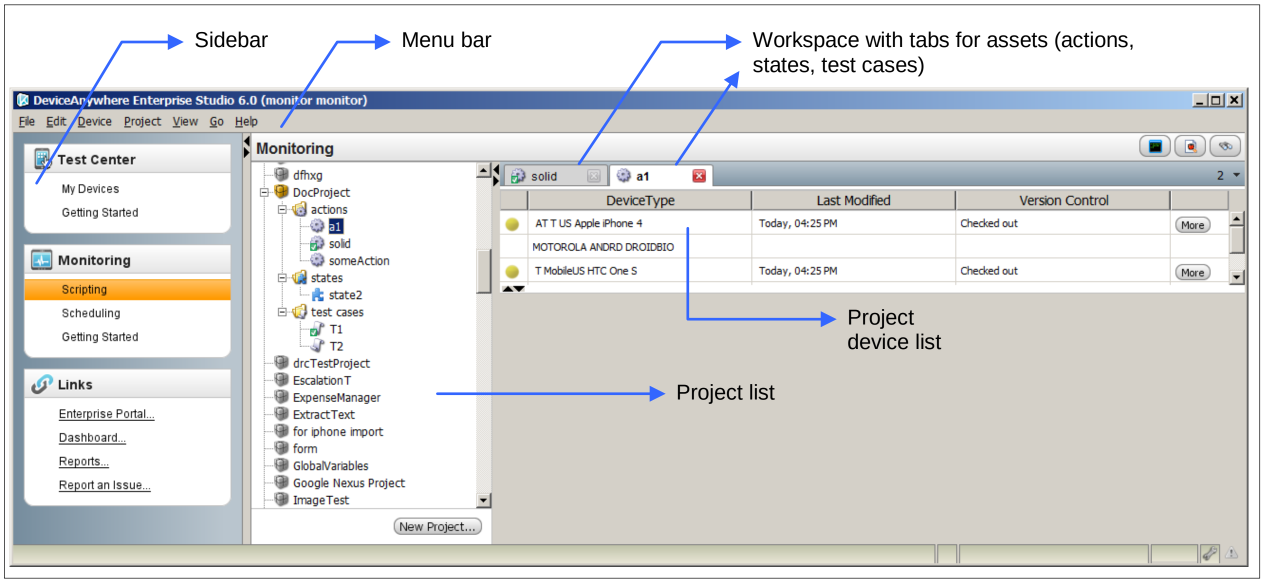
1.4.1.1 Monitoring

You can define automated monitor scripting (actions, states, test cases) and scheduling assets (transactions, monitors, QoS polices, alerts) in this view. You can schedule monitors or run and debug them ad hoc, and access the DAE Monitoring Portal from here.

Scripting

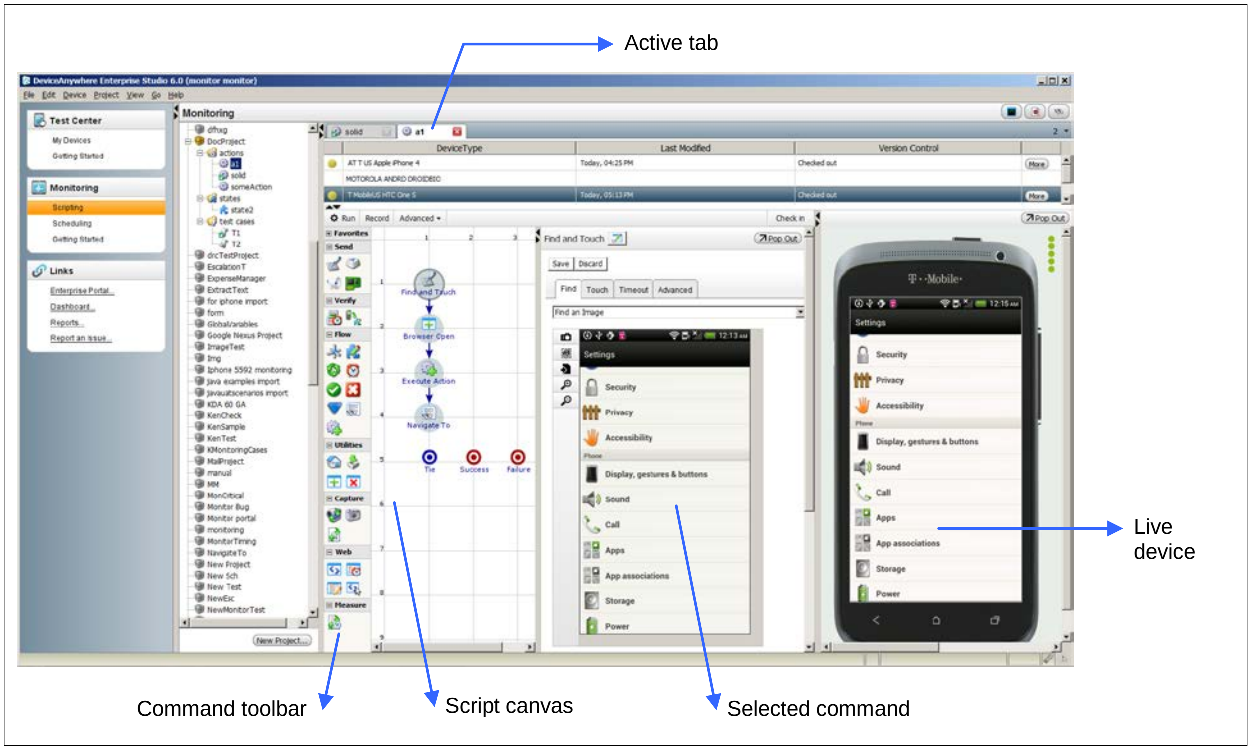
Figure 1-2 below shows the **Scripting** tab of the Monitoring view with loaded projects and their scripting assets and devices. Figure 1-3 shows the visual scripting environment for an open script.

Figure 1-2 Monitoring View with Open Tabs



DeviceType	Last Modified	Version Control	
AT T US Apple iPhone 4	Today, 04:25 PM	Checked out	More
MOTOROLA ANDRD DROIDBIO			
T MobileUS HTC One S	Today, 04:25 PM	Checked out	More

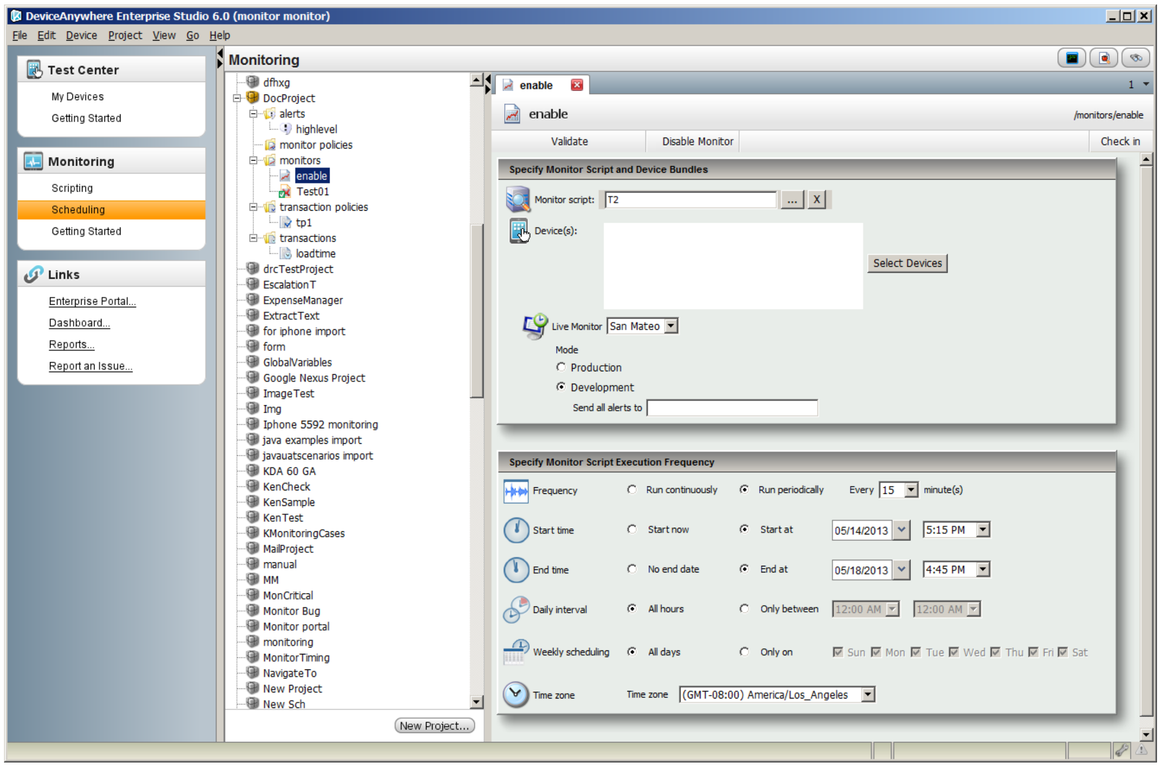
Figure 1-3 DAE Monitoring Visual Scripting Environment



Scheduling

The **Scheduling** tab in the Monitoring view enables you to set up transaction timers and policies, monitors and their schedules, monitor policies, and alerts triggered when policies are violated. Figure 1-4 below shows the interface for scheduling a monitor—selecting a test case, device, and execution schedule.

Figure 1-4 ***Scheduling*** *Tab*



Specify Monitor Script and Device Bundles

Monitor script: T2

Device(s):

Live Monitor: San Mateo

Mode: ( ) Production [✓ Development]

Send all alerts to

Specify Monitor Script Execution Frequency

Frequency: ( ) Run continuously [✓ Run periodically] Every 15 minute(s)

Start time: ( ) Start now [✓ Start at] 05/14/2013 5:15 PM

End time: ( ) No end date [✓ End at] 05/18/2013 4:45 PM

Daily interval: [✓ All hours] ( ) Only between 12:00 AM 12:00 AM

Weekly scheduling: [✓ All days] ( ) Only on ☑ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri ☑ Sat

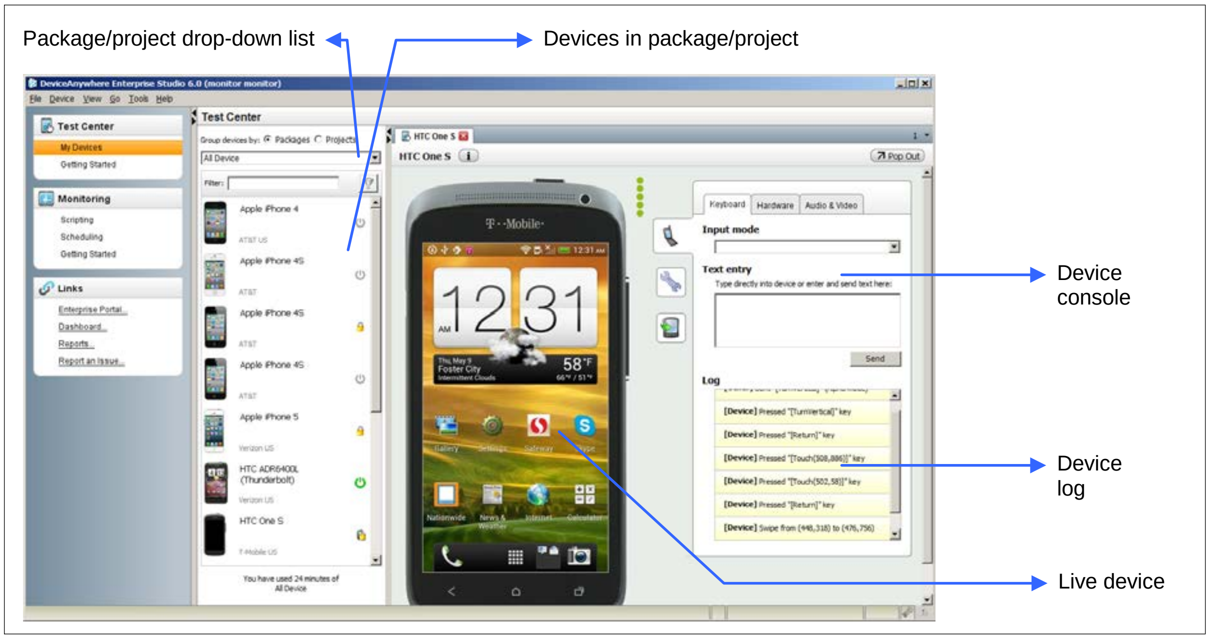
Time zone: (GMT-08:00) America/Los_Angeles

1.4.1.2 Test Center

This view allows you to view all your devices and interact with them manually. You can acquire devices, press keys/touchscreens, upload applications, and avail of other collaborations features.

NOTE You can also perform these actions in the Monitoring view.

Figure 1-5 Test Center View

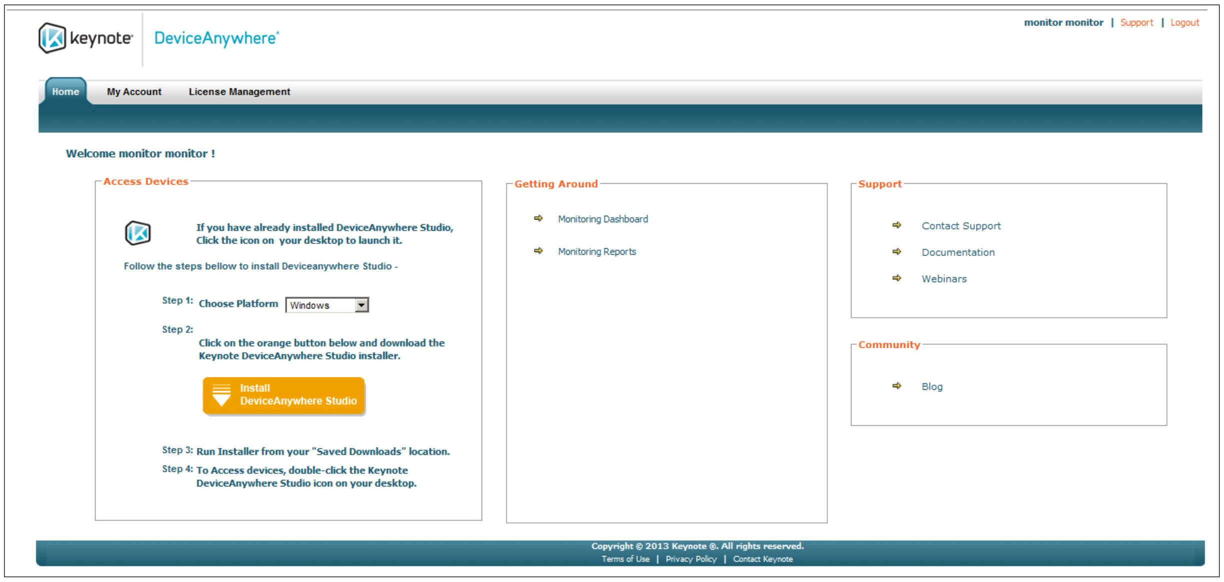


[Device] Pressed "[TurnVertical]" key
[Device] Pressed "[Return]" key
[Device] Pressed "[Touch(308,886)]" key
[Device] Pressed "[Touch(502,58)]" key
[Device] Pressed "[Return]" key
[Device] Swipe from (448,318) to (476,756)

1.4.2 DeviceAnywhere Enterprise Monitoring Portal

The DAE Monitoring Portal provides a real-time dashboard view of currently running monitors and live device screens as scripts are executed on them. Users can also view historical monitor data such as a list of all monitor executions, success rates for individual monitors, error reports, trend charts, and detailed results for failed script runs containing device screenshots. All standard reports can be customized for display using filters and date ranges. Users can save report data or report criteria and schedule and generate reports from them at any time. You can also download aggregate or raw data used to generate a chart.

Figure 1-6 Portal Landing Page


keynote | DeviceAnywhere

monitor monitor | Support | Logout

Home | My Account | License Management

Welcome monitor monitor !

Access Devices

If you have already installed DeviceAnywhere Studio, Click the icon on your desktop to launch it.

Follow the steps bellow to install Deviceanywhere Studio -

Step 1: Choose Platform [Windows]

Step 2: Click on the orange button below and download the Keynote DeviceAnywhere Studio installer.

Install DeviceAnywhere Studio

Step 3: Run Installer from your "Saved Downloads" location.

Step 4: To Access devices, double-click the Keynote DeviceAnywhere Studio icon on your desktop.

Getting Around

- Monitoring Dashboard
- Monitoring Reports

Support

- Contact Support
- Documentation
- Webinars

Community

- Blog

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Figure 1-7 Chart—Transaction Performance (Run Times) on Different Devices

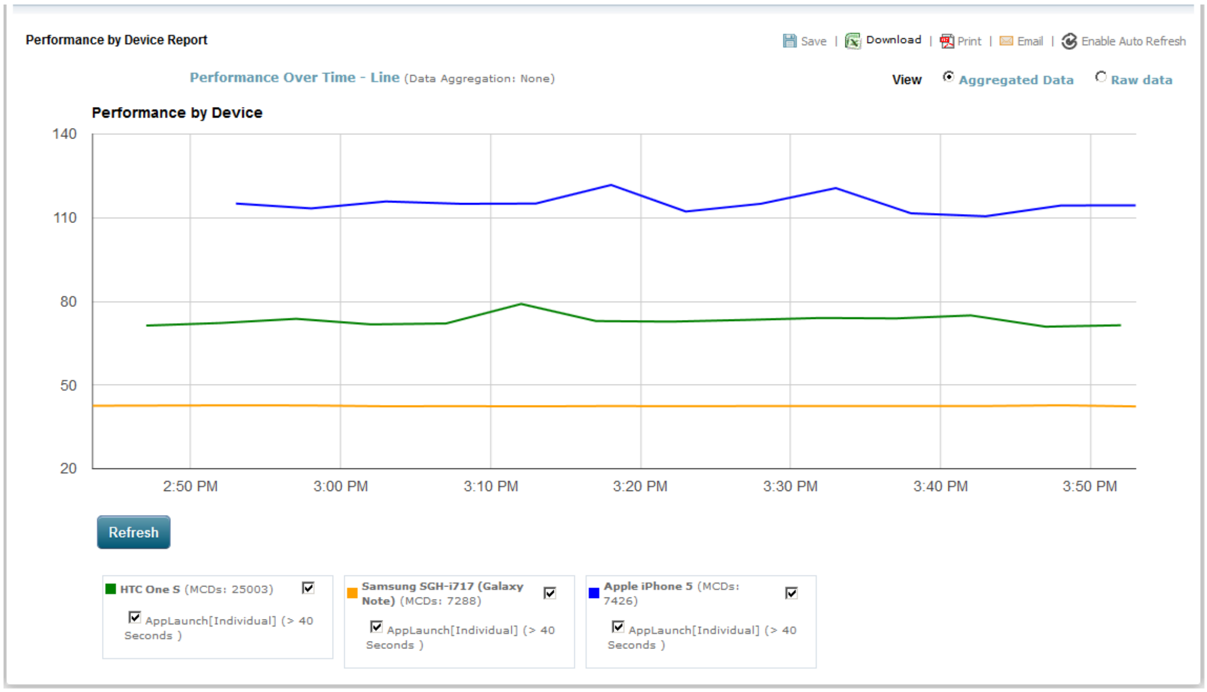
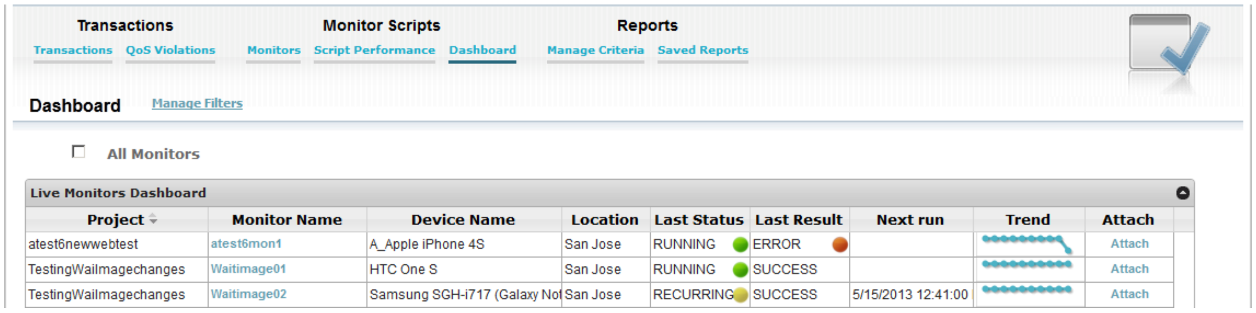


Figure 1-8 Dashboard



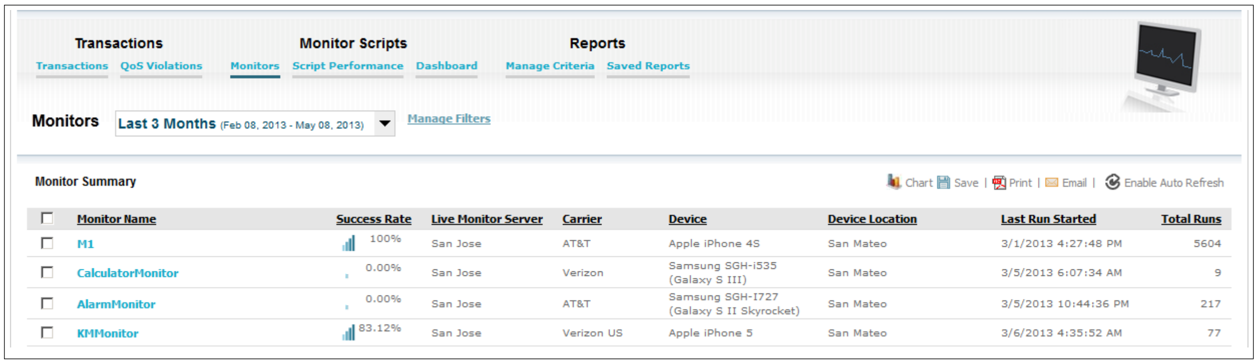
Dashboard Manage Filters

All Monitors

Live Monitors Dashboard

Project	Monitor Name	Device Name	Location	Last Status	Last Result	Next run	Trend	Attach
atest6newwebtest	atest6mon1	A_Apple iPhone 4S	San Jose	RUNNING ●	ERROR ●			Attach
TestingWaiImagechanges	Waitimage01	HTC One S	San Jose	RUNNING ●	SUCCESS			Attach
TestingWaiImagechanges	Waitimage02	Samsung SGH-i717 (Galaxy Not	San Jose	RECURRING ●	SUCCESS	5/15/2013 12:41:00		Attach

Figure 1-9 Monitor Success Rate Overview

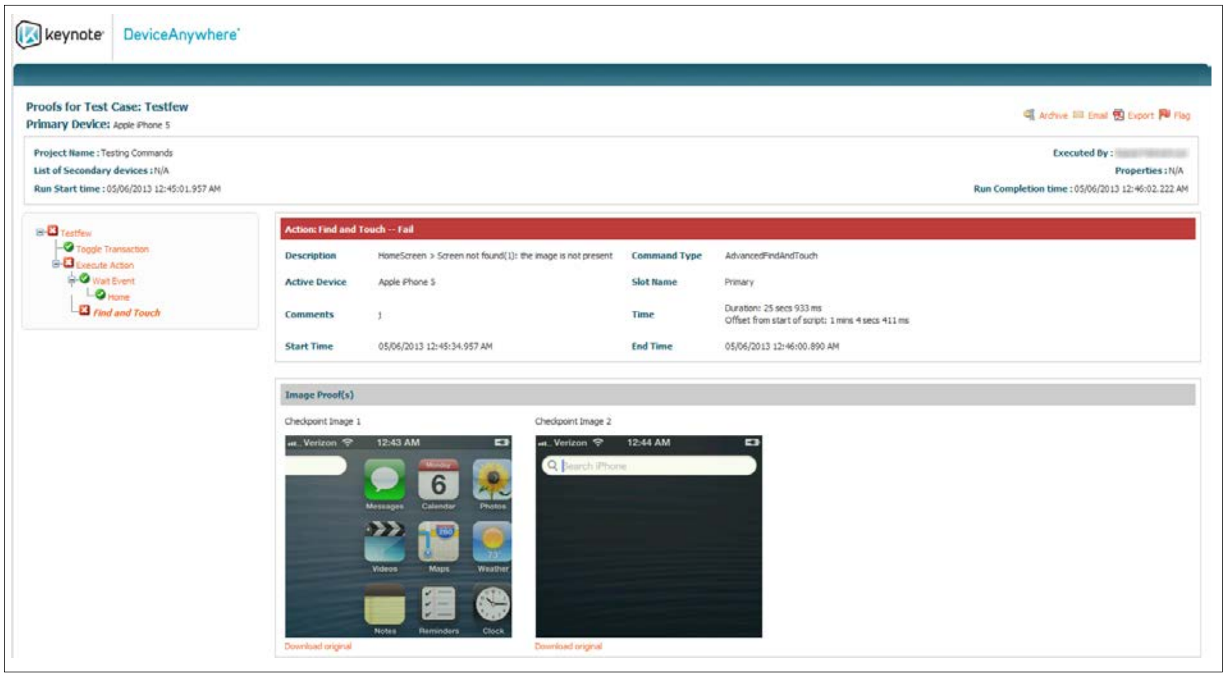


Monitors Last 3 Months (Feb 08, 2013 - May 08, 2013) Manage Filters

Monitor Summary

Monitor Name	Success Rate	Live Monitor Server	Carrier	Device	Device Location	Last Run Started	Total Runs
M1	100%	San Jose	AT&T	Apple iPhone 4S	San Mateo	3/1/2013 4:27:48 PM	5604
CalculatorMonitor	0.00%	San Jose	Verizon	Samsung SGH-i535 (Galaxy S III)	San Mateo	3/5/2013 6:07:34 AM	9
AlarmMonitor	0.00%	San Jose	AT&T	Samsung SGH-I727 (Galaxy S II Skyrocket)	San Mateo	3/5/2013 10:44:36 PM	217
KMMonitor	83.12%	San Jose	Verizon US	Apple iPhone 5	San Mateo	3/6/2013 4:35:52 AM	77

Figure 1-10 Detailed Run Results (Failed Run)



Proofs for Test Case: Testfew
Primary Device: Apple iPhone 5

Project Name : Testing Commands
List of Secondary devices : N/A
Run Start time : 05/06/2013 12:45:01.957 AM
Executed By : [redacted]
Properties : N/A
Run Completion time : 05/06/2013 12:46:02.222 AM

Action: Find and Touch -- Fail

Description	HomeScreen > Screen not found(1): the image is not present	Command Type	AdvancedFindAndTouch
Active Device	Apple iPhone 5	Slot Name	Primary
Comments	1	Time	Duration: 25 secs 933 ms Offset from start of script: 1 mins 4 secs 411 ms
Start Time	05/06/2013 12:45:34.957 AM	End Time	05/06/2013 12:46:00.890 AM

Image Proof(s)

Checkpoint Image 1 Checkpoint Image 2

1.4.3 Java API

Users can optionally use the Java API to create Java monitor scripts in DeviceAnywhere Studio or an IDE of your choice. The API also facilitates integrations with industry-standard automation and management tools from HP and IBM.

2 Concepts and Basic Workflow

The best practice workflow in DeviceAnywhere Enterprise Monitoring is best understood with reference to the hierarchy of script building blocks and their relationship to the basic units of monitoring: *monitors* and *transactions*.

The goal of scripting is to set up the key interactions that you wish to track as transactions, e.g., the time taken to process a credit card payment, launch an application, or load a web page. The end-to-end scenario required for this interaction (and possibly others) should be set up as a monitor. A monitor also includes any other required steps, such as navigating to your application from the device home screen or clearing the browser cache.

In terms of script building blocks, a monitor script is a *test case* consisting of calls to one or more *actions*, which are implemented for each device on which you wish to execute your monitor. Entire actions or portions of actions can map to the transactions you wish to track. Additionally, you might want to use *states* or script-specific commands to insert *reference points* at various points to ensure that your script is progressing as it should, e.g., you might reference the device home screen or browser landing page to define expected results for a particular step.

The best practice approach to scripting leverages DeviceAnywhere Enterprise Monitoring's powerful tools for organizing and creating reusable test assets to create device-independent test cases consisting of calls to actions and states with device-specific implementations. You can reuse transaction settings across different monitors to generate meaningful comparative data, e.g., checking the time taken to load a web page on different devices.

The DAE Monitoring workflow for setting up a monitor is completed ideally in two passes. In the first pass, you set up your actions, test case, transactions, and monitor and execute your monitor in development mode. Use the second pass for refining error reporting, transaction run times, and failure thresholds for the monitor and its transactions before final deployment.

This chapter lays the foundation for sound scripting practices by defining monitoring concepts and building blocks and then describing how they fit into the scripting workflow.

NOTE This chapter provides an overview of the scripting workflow. Details of each step in each pass of the workflow are covered in the chapters that follow.

2.1 DAE Monitoring Concepts

This section briefly describes important scripting, scheduling and reporting concepts that are foundational to using DAE Monitoring and interpreting data in the DAE Monitoring Portal.

2.1.1 Scripting and Scheduling Concepts

DAE Monitoring uses the same visual scripting interface as DeviceAnywhere Enterprise Automation (Keynote's product for functional and regression testing of mobile products on real devices). Users create *actions*, *test cases*, *transactions*, *monitors*, *QoS policies*, and *alerts* in organizational containers called *projects* in DeviceAnywhere Studio.

Scripting and scheduling tools enable users to measure the overall performance of a monitor script as well as key portions of a script, called transactions.

Project

A project is an organizational container for test assets and devices, generally specific to an application or functionality you wish to test.

Projects consist of:

- Associated devices
- Scripting assets: actions, states, and test cases
- Scheduling assets: transactions, monitors, monitor policies, transaction policies, and alerts
- Project metadata: permissions, error definitions, project variables, alert suppression window, and project dependency information

When you create a project, folders are automatically created in the project directory for different assets in both the **Scripting** and **Scheduling** tabs of the Monitoring view. Actions, test cases, and states are the main building blocks of your automated monitoring scripts and are created in the **Scripting** tab. Transaction and monitor settings, policies, and alerts triggered when policies are violated are created in the **Scheduling** tab. Scheduling assets enable you to monitor your mobile application effectively and generate meaningful reporting data.

You can further organize assets by creating sub-folders, as for separating test cases that deal with a distinct functional area of an application. A project defines reusability of assets, e.g., you can reuse an action in multiple test cases contained within a project.

Action

Actions are the basic unit of scripting and the building blocks of test cases. Actions accomplish specific tasks that might result in a change to the device state.

You can think of actions as the discrete procedures that make up the larger process that is a test case—each broad step in a test case corresponds to an action consisting of a series of device interactions and verifications. While the size of actions is not limited, they are best thought of as mini-scripts that can be reliably reused across test cases.

Actions are device-independent, that is, they are defined for all project devices and consist of device-specific implementations to account for differences in interfaces. However, actions with Web commands that operate directly on web elements can operate across devices and do not require separate implementations. Examples of actions in a test case that tests a Web site are resetting a device, opening a web browser, and navigating to a URL.

Implementation

While an action or state can be generically defined for all project devices, differences in how the devices look or behave make it necessary to create device-specific implementations. An implementation contains the specific commands or device screens that make up an action or state on a particular device.

Implementations can be created from scratch or cloned and altered from other implementations for like devices.

NOTE You can create unpartitioned actions and states where like devices share a single implementation. You can also create unpartitioned actions and states when creating scripts that interact with web elements (e.g., when testing a web application).

Test Case

A test case is the broad process that accomplishes a test goal on your mobile application or content. For example, a test case might consist of viewing and deleting call records from a device, searching for directions to a specified address in a mobile web browser, or getting the weather report for a specified zip code from a short-code weather service.

Test cases are device-independent. They generally consist of calls to previously defined actions and states with additional commands such as branches and loops to control script logic.

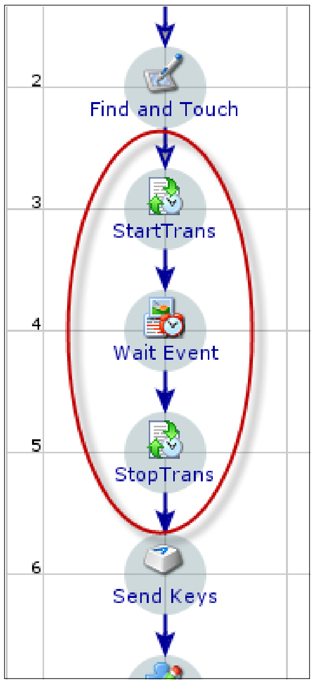
State

States define known device conditions (text-, audio-, image-, or web element-based) that can be referenced to verify the result of a sequence of device interactions. For example, states use the device home screen or the browser home page in order to specify an expected result. States can be reused across scripts, i.e., called from several actions and test cases in a project.

States are device-independent, that is, they are defined for all project devices and consist of device-specific implementations to account for differences in interfaces. If an expected result changes over time, a state can be updated in one place, without having to update every script containing a reference to it.

Transaction

Figure 2-1 Transaction



DAE Monitoring enables you to measure the overall performance of a monitor script as well as that of different portions of your script called transactions. Setting up transactions enables you to measure the performance of crucial aspects of your application or service, e.g., the time taken for a corporate web site to load, the time taken to process a credit card payment, or whether an image associated with an account is displayed upon login. You would not set up routine interactions such as resetting a device to the home screen as transactions—the success of failure of these operations have no bearing on the performance of your mobile application or service.

In a script, you use the Toggle Transaction command to delimit and apply a named transaction to the portion of the script you wish to track. You can track transaction completion times as compared to an acceptable threshold as well as the failure of a transaction to be completed as expected.

Transactions can be used in multiple monitors, enabling you to compare the same set of interactions across different monitors, e.g., the time taken to log in to an application on three different devices. In addition, transaction failure does not necessarily cause the failure of a monitor, allowing the user to separate the idea of a service failure (which does not indicate a problem with the script) from a script failure (which does not indicate an issue with the service being measured.)

The figure to the right shows a script with a transaction (highlighted) to check the time taken to load a web page correctly. Toggle Transaction commands indicate the start and the end of the transaction. The run time for this portion of the script is compared to the threshold specified in transaction settings.

Transaction policies establish tolerance levels for violations of expected run times as well as for the failure of transactions to be completed as expected. Generally, transactions and policies have a one-to-one relationship. You would only want to associate several transactions to a single policy when the transactions measure similar aspects of a service that you want to track together. When multiple transactions are associated with one policy, all the transactions are evaluated together. So a violation of the acceptable completion time in any one of the transactions contributes to the same incident.

Monitor

In the DAE Monitoring scripting architecture, a test case is the broad process that represents your monitoring scenario for your mobile application or content.

A monitor is defined as a test case script scheduled to run at a specified frequency on a monitor server and on a specified device (or multiple devices for a multi-device test case).

The test case is the broad process that represents the monitoring scenario for your mobile application, content, or device. For example, the test case might consist of logging in to and checking balances in a mobile banking application, or searching for flights based on search criteria entered in a mobile browser. Test cases are comprised of one or more actions (the discrete procedures that make up the larger process that is the test case) and states.

In addition to tracking the overall performance of the monitor script, you can track the performance of key interactions with your application or service called transactions. Transactions can map to entire actions called from the test case or to specific portions of actions.

Monitor failure is tied to the error management system and indicates an issue with the script, device, or measurement system. Monitor policies establish tolerance levels for monitor failure and specify alerts to be sent out for policy violation.

NOTE A monitor can also fail:

- Because of outright transaction failure when there are dependent interactions further down the script—specifying outright transaction failure (in addition to performance violation) is discussed in Transactions in Scripting Workflow: Round One.
- When the Success command is used to stop a script when a transaction fails outright

Monitors can be scheduled to run continuously or at any frequency through all hours of the day and days of the week. You can also schedule a monitor to run only on certain days of the week and hours of the day.

Error Categories and Types

The error management system consists of *error categories* containing *error types*, which you can call from various commands in your scripts to generate error messaging when your script fails at those points. Monitor success/failure is tied to the error management system, and you associate specific error types with a monitor policy. The policy then sets tolerance levels for triggering associated error types in a given number of script runs.

You can create project-wide error definitions in project properties (right-click a project in the project list > **Properties** > **Error Types** tab).

QoS Policies for Transactions and Monitors

Quality of service policies are the rules that define when to take action because of monitor or transaction failures and what action to take.

Monitor policies are tied to the error management system and define tolerance levels for monitor failure. You associate specific error types with a monitor policy. The policy then sets tolerance levels for triggering associated error types in a given number of script runs.

Transaction policies establish tolerance levels for violations of expected run times or failure of a transaction to be completed as expected. Both monitor and transaction policies support sending out different alerts for up to three levels of escalation. If a level 1 violation is defined as 3 failed runs out of 6, and 3 out of the first 4 runs have failed, the system triggers an alert immediately; it does not wait to complete 6 runs before sending out the alert.

Alerts

Email or SNMP alerts are triggered when a monitor or transaction policy is violated or when an incident is resolved. Alert settings include method of delivery (email vs. SNMP), recipient list, frequency of delivery, and a customizable message body. In transaction or monitor policies, you specify the alerts triggered for up to three levels of violation as well as incident resolution. Alerts can be reused, e.g., across multiple policies within your project or for multiple violation levels within the same policy.

Alert Suppression

Alert suppression is a window of time during which there no alerts and escalation processing for monitors being executed. This window enables scheduled maintenance and is defined in project properties. Monitor runs during the window appear in the dashboard but not in the execution report.

If there are monitor runs in progress at the start of the window, they trigger the appropriate escalations and alerts. Any existing escalations at the start of the window do not change status during the window.

2.1.2 Execution and Reporting Concepts

This section provides brief definitions and descriptions of execution and DAE Monitoring Portal reporting concepts.

Dashboard

The DAE Monitoring Portal dashboard provides the ability to view the status of most recently executed monitor runs, upcoming scheduled runs, and live device screens as monitor scripts are being executed on them. Monitors runs during an alert suppression window also show up in the dashboard. Icons provide a quick visual indication of run result (success or failure) and monitor status (running, disabled, etc.). A link next to each monitor allows you to view the device screen during monitor execution.

Execution Report

The execution report (**Execution Report** link at the top-right corner of the DAE Monitoring Portal) is the exhaustive list of every monitor run in your system, excluding runs during an alert suppression window. By default, runs are arranged most recent first, with information on device, carrier, run result, and a link to view screen-by-screen results for failed runs. Users with permissions can exclude specific runs from the execution report, which also excludes them from all other reports in the DAE Monitoring Portal.

Monitor Summary Report

The monitor summary in the Monitor Scripts view of the DAE Monitoring Portal displays the overall success rate and total number of runs for every monitor in your system over a specified date range. Each monitor has a link to view monitor details. You can select monitors to be displayed in a comparative chart of transaction times (monitor performance) or a visual representation of monitor success or failure (monitor availability) over a period of time.

Monitor Details

The monitor details report, which opens up when you click the name of a monitor anywhere in the DAE Monitoring Portal, displays the total number of runs, success rate, a graphic representation of the success rate and failures (by error type), transaction times, and the total number of monitor incidents and escalations at each level. There are also links to view detailed incident reports and screen-by-screen results for failed runs.

Transaction Summary Report

The transaction summary in the Transactions view of the DAE Monitoring Portal displays the success rate and total number of transaction runs over a specified date range for every transaction in your system. Transaction details can be viewed by clicking a transaction name.

You can select transactions to be displayed in a comparative chart of transaction times (transaction performance) or a visual representation of transaction success or failure (transaction availability) over a period of time.

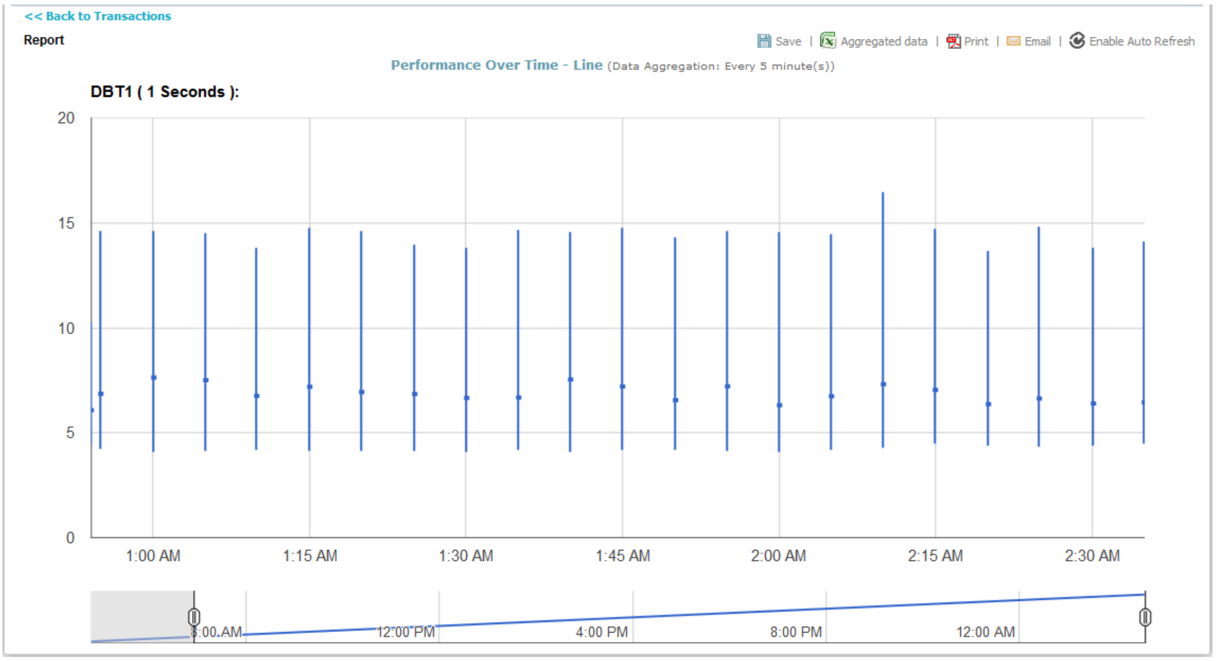
Transaction Details Report

The transaction details report opens up when you click the name of a transaction. It displays the total number of transaction runs with the success rate and its graphic representation. It lists the monitors, devices, and locations from which the transaction has been executed and also lists total number of transaction incidents and escalations at each level.

Candlestick Chart

A candlestick chart shows the maximum, minimum, and average run time for a transaction at different points in the day over the date range chosen.

Figure 2-2 Chart: Transaction Performance Candlestick



Incident

The first run that violates a transaction or monitor policy generates an incident. An incident begins at the lowest escalation level and is tracked through up to two further levels until it is resolved. Incidents may be resolved at any escalation level. Incidents and their resolution trigger alerts.

Incident Summary and Details

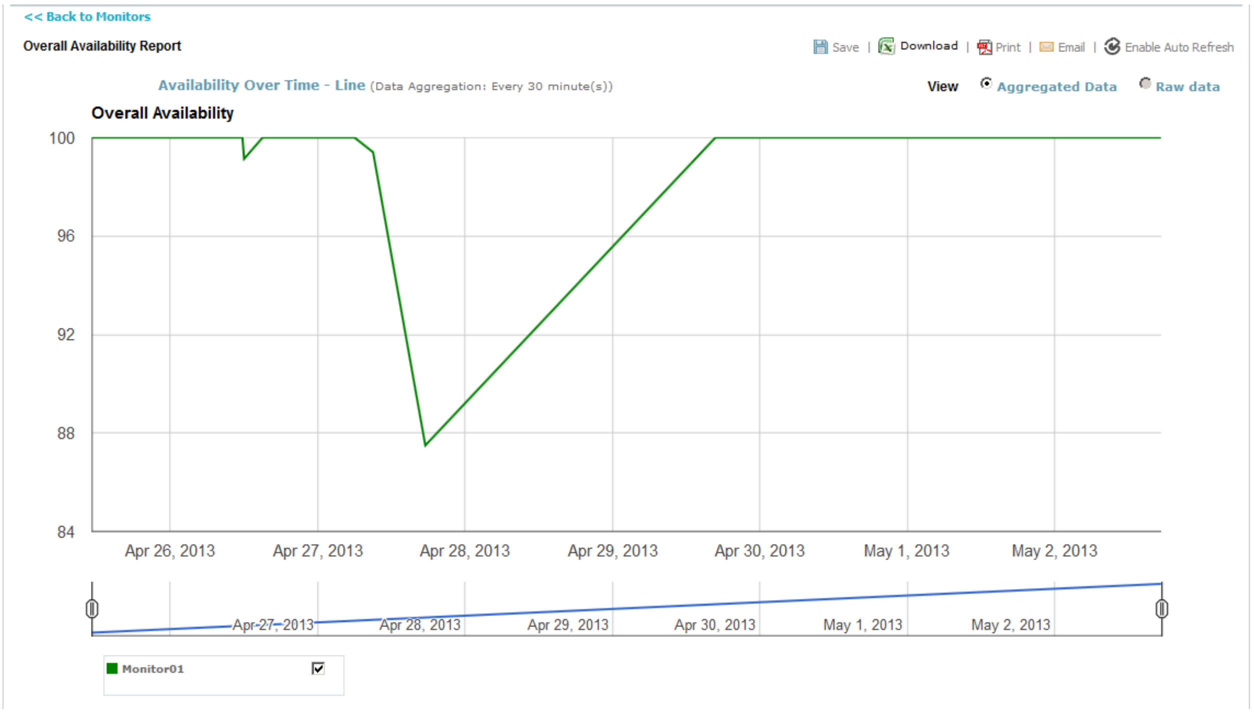
The most recent monitor incidents and their current status are displayed in the **Script Performance** tab. The most recent transaction incidents are displayed in the **QoS Violations** tab. Click an **Incident Start Time** to view a detailed incident report. An incident report displays a run-by-run analysis of an incident, from the first level of escalation when alerts were sent out to incident resolution.

Monitor incidents (monitor policy violations) are listed in the monitor details report, and transaction incidents are listed in the transaction details report.

Availability Chart

Availability charts visually represent the success or failure of a transaction or monitor over a period of time. A value of 100 represents a success while 0 represents a failure. However, when viewing availability over a long period of time, data may be aggregated and then averaged over smaller intervals. The image below shows the overall availability of a monitor over two days.

Figure 2-3 Chart: Overall Availability over Time

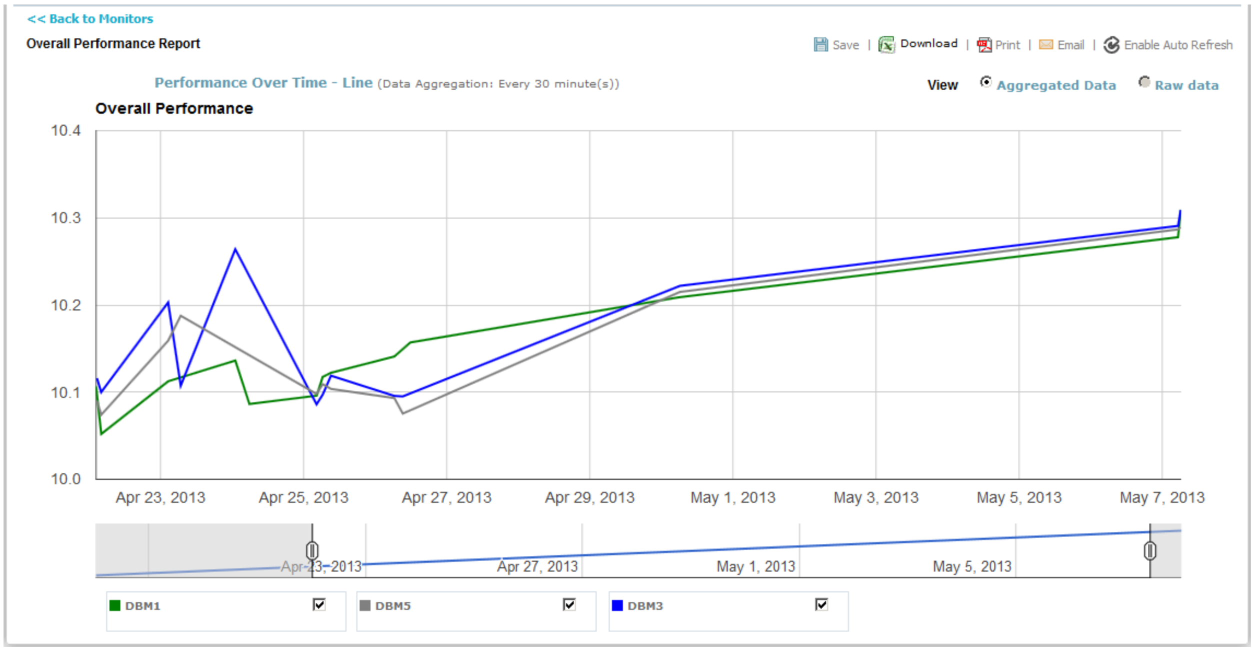


<< Back to Monitors
Overall Availability Report
Save | Download | Print | Email | Enable Auto Refresh
Availability Over Time - Line (Data Aggregation: Every 30 minute(s))
View ● Aggregated Data ○ Raw data
Overall Availability
100
96
92
88
84
Apr 26, 2013
Apr 27, 2013
Apr 28, 2013
Apr 29, 2013
Apr 30, 2013
May 1, 2013
May 2, 2013
Monitor01

Performance Chart

You can select one or more monitors to view completion times of all transactions in the monitor(s) over a selected date range. A performance chart for transactions shows the completion times of each transaction selected over the date range chosen. The image below shows the performance of two monitors that use the same two transactions.

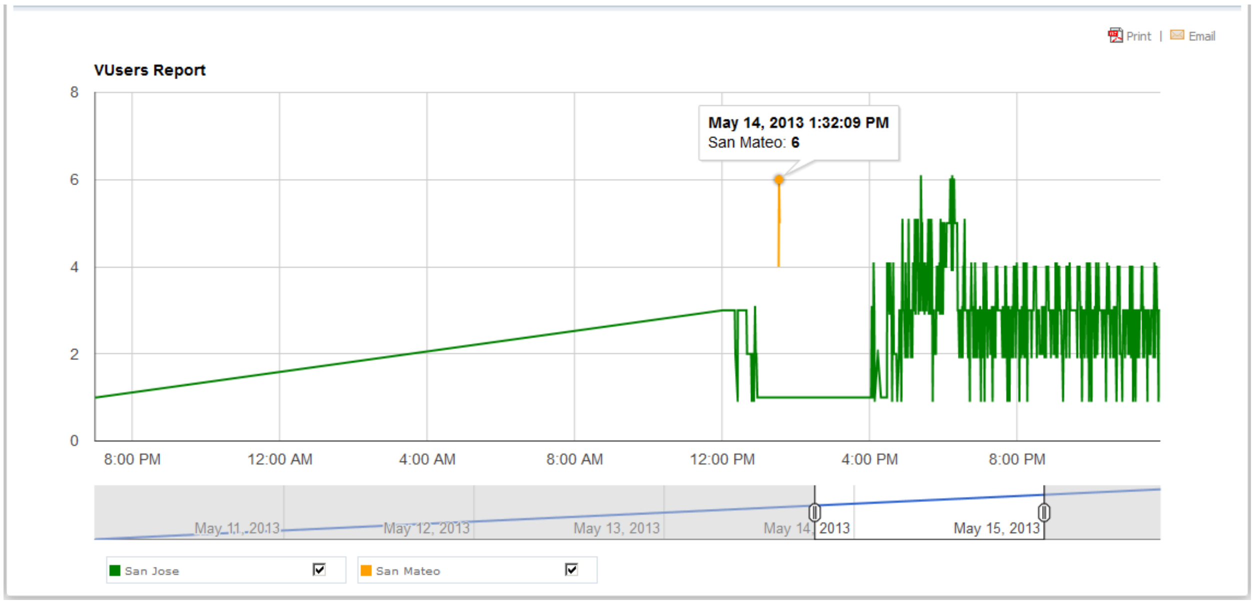
Figure 2-4 Chart: Monitor Performance over Time



Vuser Chart

The Vuser chart shows the number of Vuser licenses used at any minute in your system over a specified period of time. If you have 2 Vuser licenses, you might still be able to execute 4 monitors a minute using 2 licenses for 25 seconds at a time. The image below shows Vuser license usage for two LiveMonitor Server locations (in green and yellow). Hover over a point to see the associated number of Vuser licenses.

Figure 2-5 Vuser Chart on Two Servers



2.2 Best Practice Scripting Workflow

Script building blocks are constructed and refined ideally in two passes. In the first pass, you identify key interactions you wish to track as transactions and define your objectives in terms of the high-level monitoring scenario required to track key interactions. Actual scripting begins with the creation of a project, actions, states, and their implementations. You progressively define building blocks till you are ready to construct modular test cases, which represent the high-level monitors you want to execute. Next, you execute monitors in development mode and check the dashboard.

The second pass consists mainly of refining error types and policies and optimizing ideal transaction run times based on viewing initial results. Finally, you deploy monitors in production mode and track monitoring data.

In this workflow, *the actual process of scripting begins with creating actions and implementing them*, inserting reference points for verification and error types for reporting. The greater part of scripting consists of creating action implementations.

NOTE The steps identified below cover the monitor scripting workflow in brief. The first pass is covered in detail in Scripting Workflow: Round One and the second pass in Scripting Workflow: Round Two.

The *first pass of the scripting workflow* consists of the following steps:

1 Identify key interaction(s) with your mobile application, service or content that you wish to track, e.g., the time taken to process a payment. These interactions should be set up as transactions in scripts.

2 Conceptualize the end-to-end scenario you need to construct in order to track these key interactions. This end-to-end scenario should be set up as a device-independent test case in the course of scripting (and deployed as a monitor). For example, in order to track the time taken to process a credit card payment, your end-to-end scenario might include resetting the device to the home screen, navigating to an e-commerce Web site, searching for and adding an item to a shopping cart, entering shipping and credit card details, and finally, placing the order.

3 Identify devices you would like to monitor on and the procedures that can be used as the basis for creating reusable actions.

4 Create a project in the Monitoring view and add devices to it.

5 Begin scripting by creating actions to accomplish specific tasks within the larger test case objective, e.g., navigating to an e-commerce Web site, searching for an item, adding the item to a shopping cart, and completing order details and placing the order.

Create device-specific action implementations to account for differences in device interfaces or use unpartitioned actions when working directly with web elements.

6 Define and use reference points in script-specific commands or in reusable states. Reference points are device output (text, video, audio, or web elements) that verify a sequence of device interactions.

7 Specify *proofs* to be captured from various commands when your script fails at those points. Proofs are device screenshots or video and are displayed in detailed, step-by-step results for failed runs.

8 Create a test case consisting of calls to actions and states, and any script logic.

9 Set up and use transactions in your scripts to establish run times for key command sequences. You can map an entire action or a portion of it to a transaction. To create a transaction:

a Create a named transaction with an expected run time setting in the **Scheduling** tab.

b Use the *Toggle Transaction command* in your script to call the named transaction and mark start and end points of the interaction you wish to track.

NOTE Set a very high threshold for failure for executing a monitor in development mode.

10 Create error types and call them from various commands to generate error messaging when your scripts fail at those points. Monitor success or failure is tied to the error types encountered during execution. Error types are required to set up monitor policies.

11 Optional: Define *variables* to dynamically pass data sets to your scripts at runtime.

12 Validate and debug scripts by running them from DeviceAnywhere Studio. These results can be uploaded and accessed from `<DAE Monitoring Portal address>/ResultsPortal.aspx`.

13 Create a monitor consisting of a test case scheduled to run on a monitor server and a selected device.

14 Optionally in the first pass, set up a monitor policy (without alerts) for your monitor. A monitor policy establishes tolerance levels for monitor failures triggered by selected error types.

15 *Publish your project* and *enable your monitor* in *development mode*.

16 Ensure that your monitor appears in the dashboard of the DAE Monitoring Portal.

The *second pass of the scripting workflow* consists of the following steps:

1 Review monitoring data in the DAE Monitoring Portal:

- Review proofs in results for failed runs to see why the script might be failing.
- Review the monitor details report to see which errors are triggered.
- Review transaction performance.

2 Soak your monitor, i.e., run it several times and adjust settings till you have a high success rate:

a Rework your script to eliminate scripting errors that can cause a monitor to fail, e.g., insert wait times between commands to allow a device screen to “catch up” to a script, eliminate dynamic text or images from reference points.

b Adjust your error types to provide adequate reporting at various points where your monitor might fail. If required, create and insert (additional) error types for issues with the device, carrier network, application, etc.

c Adjust transaction settings based on actual run times if required.

d Create alerts as required for the escalation paths you define in transaction and monitor policies and for incident resolution.

e Adjust/create monitor polices:

- Associate/change associated error types.
- Define the number of failures out of a fixed number of runs that constitute different levels of violation.
- Associate alerts for violation levels and optionally, for incident resolution.

f Create transaction policies associated with named transactions:

- Define the number of failures out of a fixed number of runs that constitute different levels of violation.

- Associate alerts for violation levels and optionally, for incident resolution.

3 Publish your project and execute your monitor in production mode.

4 Review monitoring data in the DAE Monitoring Portal.

3 Scripting Workflow: Round One

The first pass of the scripting workflow begins with conceptualizing and identifying key mobile interactions you would like to track, the end-to-end monitoring scenario required to set up these interactions, and reusable script components within the monitoring scenario. Most of the scripting is also completed in the first pass, at the end of which you should have created actions, states, test cases, transactions, and monitors. You can also set up and use error types, which are tied to monitor policies. The purpose of this round of scripting is to create and deploy a monitor in development mode so you can analyze initial returns with a view to refining scripts in the second pass (discussed in Scripting Workflow: Round Two).

This chapter provides instructions and guidelines for each step in the first pass of the scripting workflow, outlined in brief in Best Practice Scripting Workflow.

NOTE This document does not provide exhaustive instruction on using the visual scripting environment—refer to the *DAE Automation User Guide* for step-by-step information on creating and maintaining script assets, using visual commands, and a command reference.

3.1 Step: Identify Key Interactions to Track

Identify key interaction(s) with your mobile application, service or content that you wish to track the performance of, e.g., the time taken to launch a mobile application, the time taken to log in to an application (with and without credentials stored), or the time taken to process a credit card payment. These interactions will need to be set up as transactions in the course of scripting.

The DeviceAnywhere Enterprise Monitoring system does not enforce the creation and tracking of transactions; you can deploy monitors that do not use transactions to accomplish and track a broad test goal, e.g., deleting or creating entries in a list of contacts, searching for flights in an airline schedule, or making an online purchase. However, using transactions helps you to focus attention on critical interactions in a monitor scenario are relevant to your mobile product. It also ensures that script failure at a step that is not relevant to your service does not send out false alarms. You can target key interactions that can vary in performance and impact customer experience by setting up transaction policies that are separate from monitor polices. Transactions are also tracked independently in the DAE Monitoring Portal, and you can find both device-independent and device-specific metrics on transaction performance and availability.

3.2 Step: Conceptualize the End-to-End Monitor Scenario

Conceptualize (in device-independent terms) the end-to-end scenario you will need to construct in order to track these key interactions. This end-to-end scenario, or broad monitoring goal, must be set up in the course of scripting as a device-independent test case (and deployed as a monitor).

The end-to-end monitoring scenario includes steps to set up the interaction(s) you wish to track as well as steps to facilitate working with real devices in an automated monitoring environment, e.g., resetting the device to the home screen (in order to start from a known position) or clearing the browser cache.

For example, in order to track the time taken to process a credit card payment, your end-to-end scenario might include resetting the device to the home screen, navigating to an e-commerce website, searching for and adding an item to a shopping cart, entering shipping and card details, and placing the order.

The monitoring goal is accomplished by a modular test case, which can be broken down into discrete procedures, represented by actions. Test cases are generally device-independent; a test case script is valid for all project devices. A test case makes calls to actions or states, which can have device-specific implementations. When working with web elements, however, actions and states are unpartitioned.

3.3 Step: Identify Monitor Building Blocks

Identify test case building blocks, or constituent procedures that can be used as the basis for creating reusable actions. Breaking down your monitor scenario into discrete procedures has several advantages:

- The task of scripting is broken down into smaller, manageable units.
- Each discrete procedure is used as the basis for an action, which can be reused in other test cases within your project. For example, actions for opening an application or closing an application can be reused in multiple test cases that accomplish different application goals.

In a monitoring scenario to track the time taken to process a credit card payment, actions might include resetting the device to the home screen, navigating to an e-commerce website, searching for and adding an item to a shopping cart, entering shipping and credit card details, and finally, placing the order.

Identify devices you would like to execute the monitor on—actions and states must have implementations for each of these devices. When working with web elements, however, actions and states are unpartitioned.

3.4 Step: Create a Project

All scripting and scheduling assets (generally, specific to an application or functionality you wish to test) in the DeviceAnywhere Enterprise Monitoring environment are contained within a project.

Projects consist of:

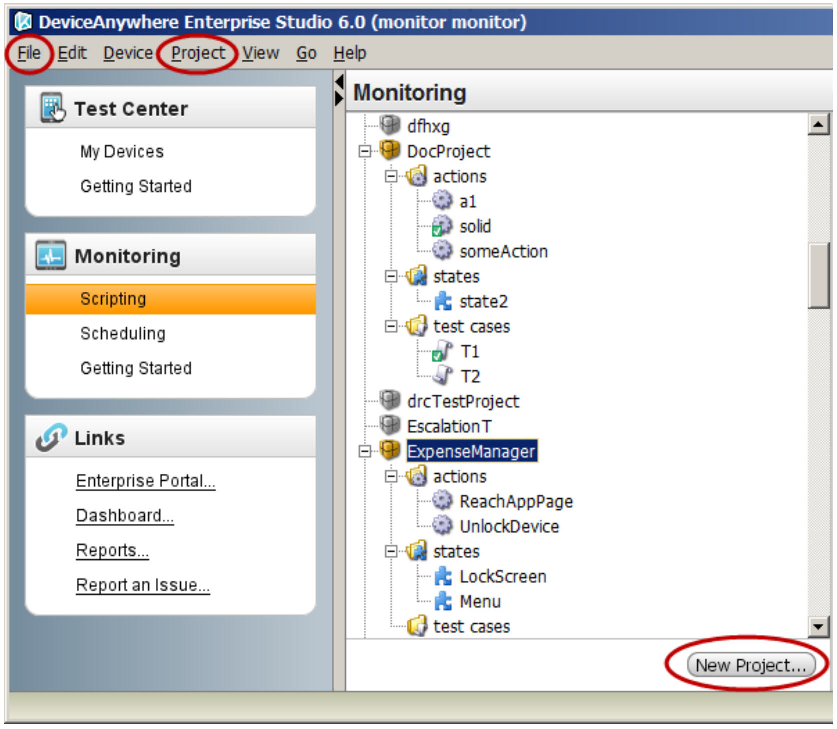
- Associated devices
- Scripting assets: actions, states, and test cases
- Scheduling assets: transactions, monitors, monitor policies, transaction policies, and alerts
- Project metadata: permissions, error definitions, project variables, alert suppression window, and project dependency information

A project defines reusability of assets, e.g., actions can be reused across test cases contained within a project.

You can create a project in any of these ways from either the **Scripting** or the **Scheduling** tab of the Monitoring view:

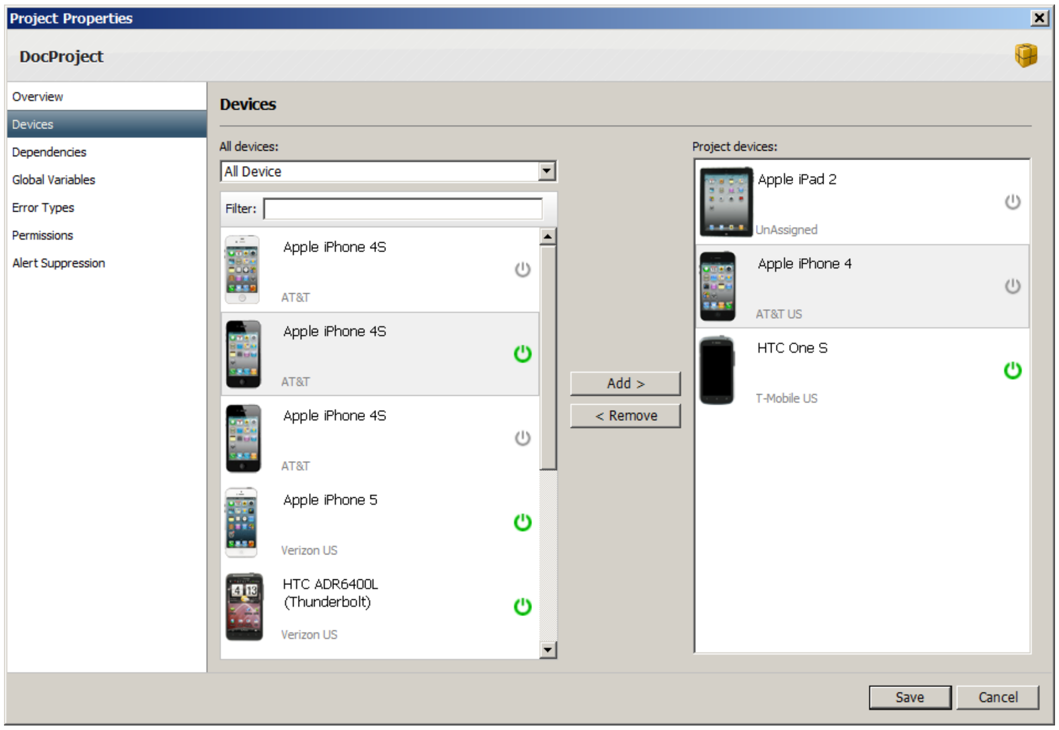
- Select **New Project** from the bottom of the project list.
- With an open project selected in the project list, select **File** > **New** > **New Project**.
- Select **Project** > **New Project**.

Figure 3-1 To Create a Project



You can add devices in project properties when creating a project or at any other time (right-click the project > **Properties**, or select **Edit Project Devices** in the workspace of an open script). Actions or states are created with placeholders for implementations for each project device. Placeholders are added or removed as you edit project devices.

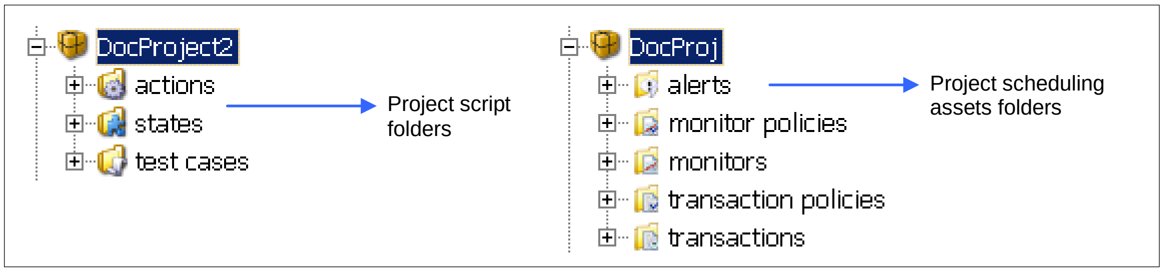
Figure 3-2 Project Devices in Project Properties Dialog Box



Scripting assets are created and displayed in the **Scripting** tab, scheduling assets in the **Scheduling** tab. Both tabs share the same library of projects.

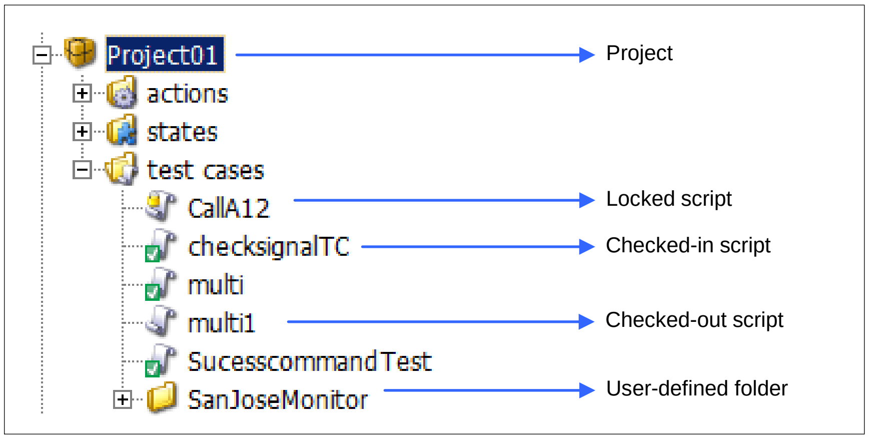
When you create a project, folders for each asset type are automatically created in the project directory in both the **Scripting** and **Scheduling** tabs. You can further organize assets by creating sub-folders, as for separating test cases that deal with a distinct functional area of an application.

Figure 3-3 Default Project Folders



Each asset type has its own icon.

Figure 3-4 Project Directory



- The lock icon near an asset indicates that it is locked for editing by another user.
- The check mark near an asset indicates that it is checked in to the version control system.
- An asset without a mark indicates that you have it checked out for editing.

A project defines reusability of assets, e.g., you can reuse an action in multiple test cases contained within a project.

3.5 Step: Begin Scripting – Create Actions

An action performs a specific procedure on all project devices, e.g., resetting the device, opening an application, or sending a message.

An action generally consists of device-specific implementation that account for differences in device interfaces. You can also record or program commands that interact directly with HTML elements in a web page to create scripts that operate across supported device models and OS versions.

NOTE Implementations for like devices can be merged—see the *DAE Automation User Guide* for details.

Actions are used as building blocks for test cases, which string together several actions and states to perform an end-to-end scenario or accomplish a broad monitoring goal on a mobile device. Once implemented, actions can be reused in any number of test cases.

3.5.1 Creating an Action and Implementation

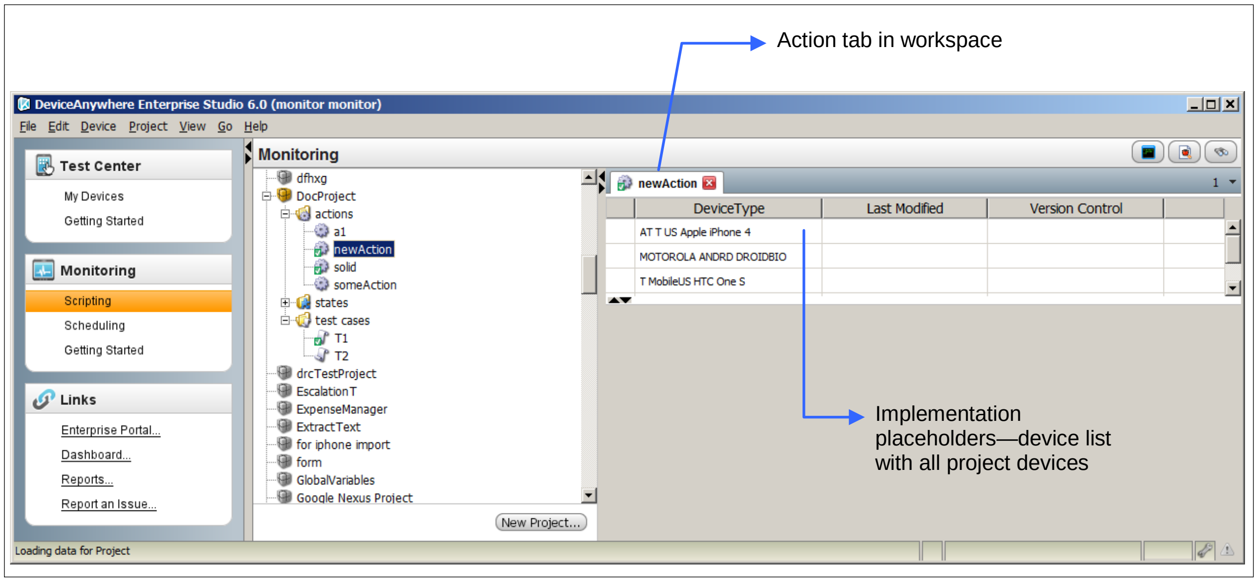
The actual process of scripting begins with creating actions and implementing them.

Use any of these methods to create an action from the **Scripting** tab of the Monitoring view:

- Right-click your project `actions` folder (or sub-folder) and select **New Action**.
- While in your project, select **File** > **New** > **Action**.

A tab for the action is opened in the workspace with placeholders for each project device.

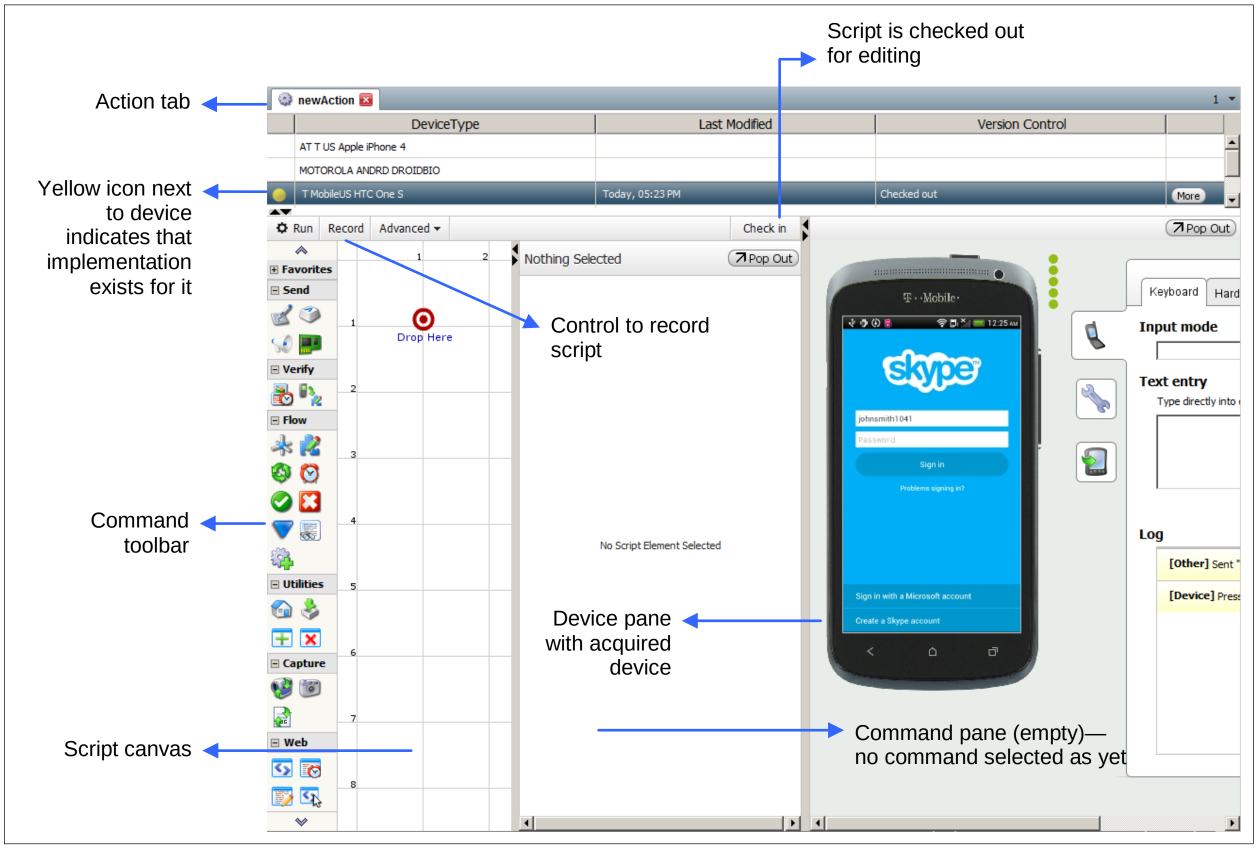
Figure 3-5 New Action



Select a device from the device list and click **Implement** to view the scripting canvas and toolbar. A yellow icon next to a device indicates that an implementation now exists for it.

Acquire the device to interact with it live. Drag commands from the toolbar (see Figure 3-6 below) onto the script canvas and change/enter settings as you interact with the device. Arrows connect the commands, indicating the order in which they will be performed.

Figure 3-6 New Implementation



3.5.2 What an Action Should Contain

While the size of actions is not limited, they are best limited to performing procedures that are the same across test cases, and hence, can be reused. You can map portions of an action or an entire action to a transaction.

3.6 Step: Reference Points

Define and use reference points in script-specific commands or in reusable states. Reference points are device output (text, video, audio, or web elements) that verify a script sequence. In partitioned states, create device-specific implementations to account for differences in device interfaces.

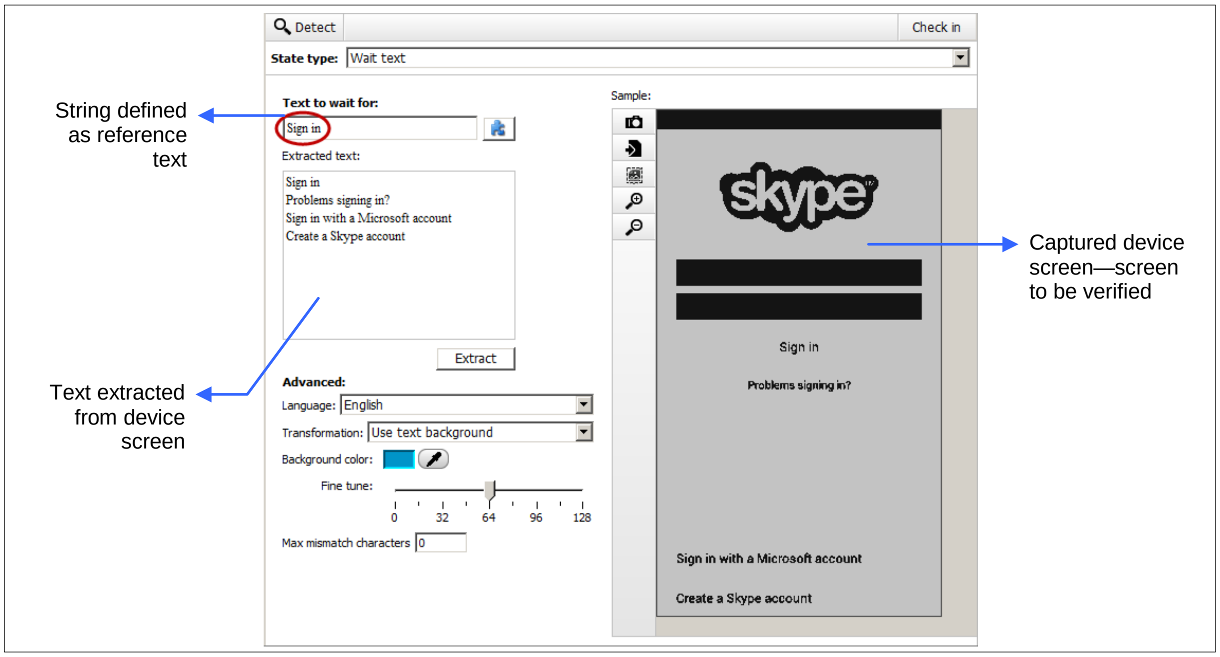
3.6.1 Description

In a reference point, you capture the device screen you want verified. You then specify an image region or string of text from the captured screen as a reference point, or expected result. If working with web application or page, you can specify an element from the page markup as a reference point. At run time, the live device screen is compared to the reference point to ensure that the script is proceeding as it should.

NOTE The differences between reference points in script-specific commands and in states as well as the mechanics of capturing a reference point is discussed in the *DAE Automation User Guide*.

You can use a string of text from a device screen to define a text-based reference point. For instance, you can use static text from an application landing page to verify that a device has opened it correctly. TCE Monitoring uses optical character recognition (OCR) technology to verify that text on the device screen matches the reference string. OCR technology can match a string of text regardless of changes in font size or font shape on the device.

Figure 3-7 Text-Based Reference Point in a State Implementation



State type: Wait text

Text to wait for: Sign in

Extracted text:

Sign in
Problems signing in?
Sign in with a Microsoft account
Create a Skype account

Language: English

Transformation: Use text background

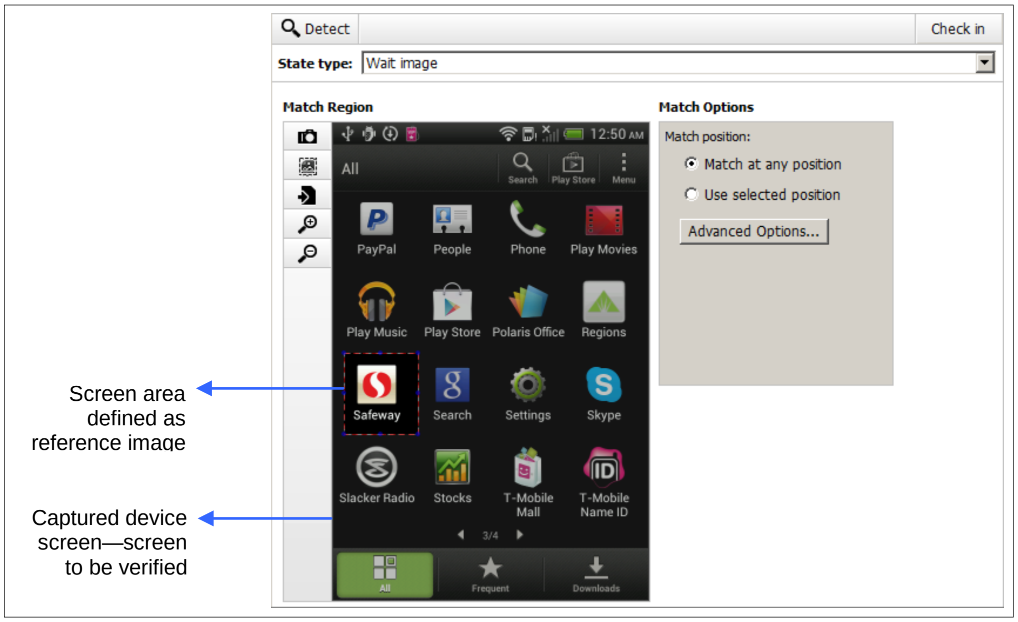
Fine tune: 64

Max mismatch characters: 0

String defined as reference text
Text extracted from device screen
Captured device screen—screen to be verified
Detect
Check in
Sample:
Extract
Advanced:
Background color:
0
32
64
96
128
skype
Sign in
Problems signing in?
Sign in with a Microsoft account
Create a Skype account

You can define an area of the device screen as a reference image. For instance, you can define an application icon as the reference image for the home screen. At runtime, DAE Automation uses pixel-to-pixel image matching technology to match the actual device screen to the reference image for verification.

Figure 3-8 Image-Based Reference Point in a State Implementation



State type: Wait image

Match position: [✓ Match at any position] Use selected position

3.6.2 General Guidelines on Using Reference Points

General guidelines:

- Use verifications throughout your monitor script and constituent actions.
- Set up verification failure to trigger an error, as all errors encountered, whether or not they are tied to monitor policies, are reported in the monitor details report in the DAE Monitoring Portal.

  Create and use error categories and types to correctly indicate the type of error, e.g., reserve some error types strictly to indicate problems with your mobile application, service, or content.
- Set your script to fail if an error is triggered as a result of verification failure, as subsequent script activity generally depends on successful completion of preceding commands. Script failure farther down the line is more difficult to diagnose when looking at results.

NOTE *DAE Guide to Text Matching* and *DAE Guide to Image Matching* contain several guidelines on setting up your device for using reference points and on avoiding false matches and false match failures.

3.6.3 Reference Points in Transactions

In transactions:

- Use verifications in transactions—very often, your transaction will consist only of a verification command and its branches, e.g., to verify that a page loaded correctly within acceptable run times, you will want to wrap a transaction around a verification command.
- Use Wait Event with logic for success/fail branches for verifications in transactions. Wait Event enables you to define a combination of reference points as the basis for creating script branches, e.g., if a reference image is found, the script takes the associated branch. You can call a pre-defined state from Wait Event. This command is useful when there are multiple possible outcomes for a command sequence, and a different course must be followed depending on the outcome.
- In addition to wrapping the Toggle Transaction command with **Stop** and **Start** settings around a Wait Event command, you can also use the **Fail** setting of Toggle Transaction in Wait Event branches to specify outcomes where a transaction should fail outright (see transactions).
  - Follow this in most cases with a **Fail** scripting command so you can fail the script and trigger error reporting (see Figure 3-9 below). This is reported with other error types in the monitor details report.
  - In branches where a transaction fails outright, you can also use the Success command and select the **Stop Script** check box (see Figure 3-10 below). This stops the script without triggering an error. In the Portal execution report, the run is displayed with a Success link. You should customize the message in the Success command to indicate transaction failure.

Figure 3-9 Transaction with Wait Event and Fail Command

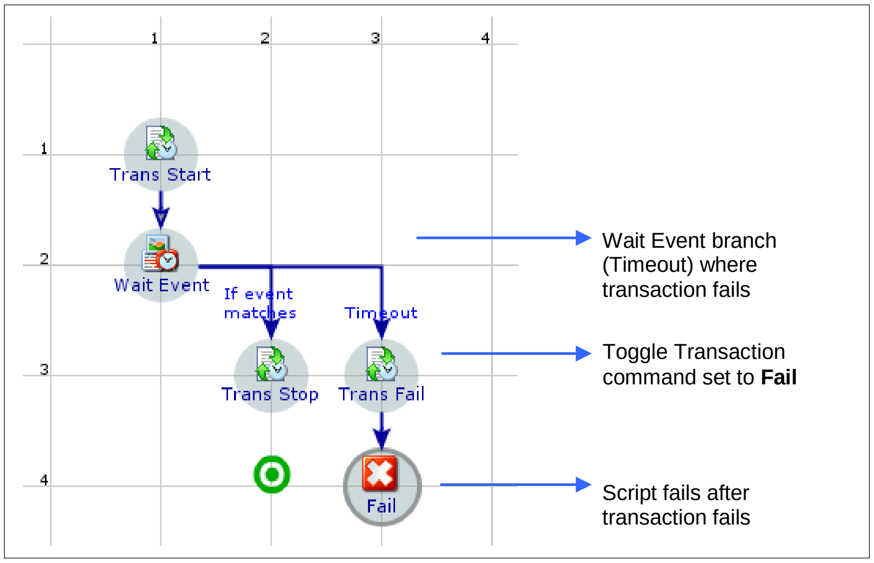
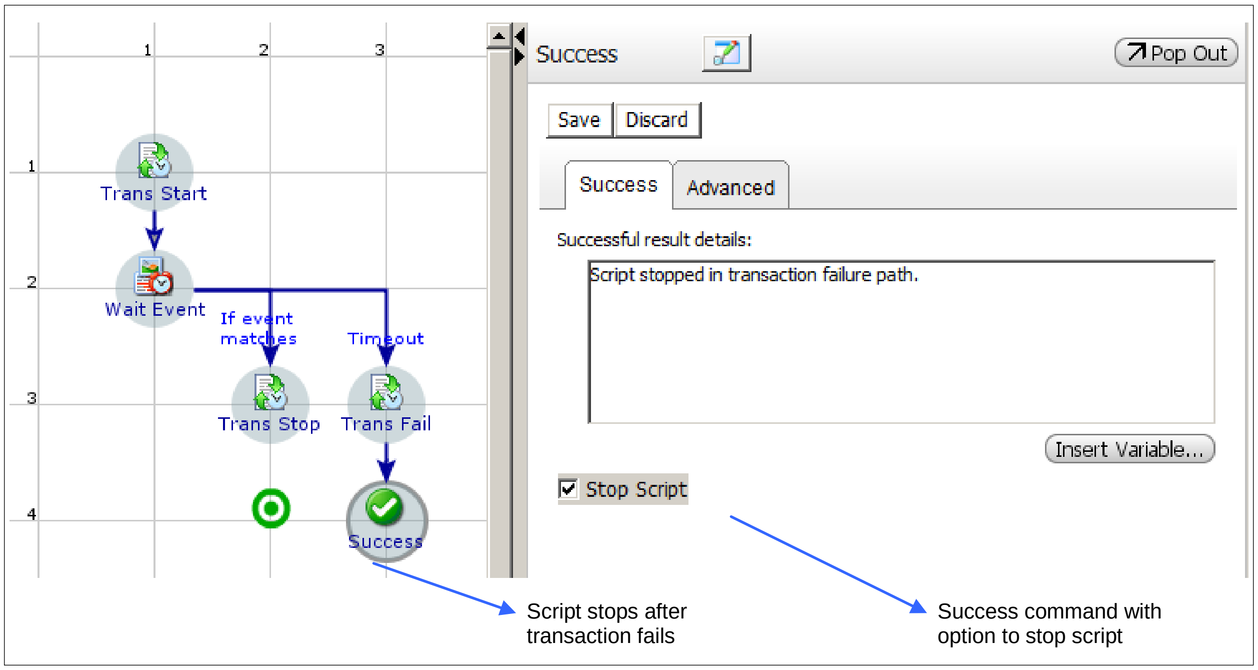

1
2
3
4
Trans Start
Wait Event
If event matches
Timeout
Trans Stop
Trans Fail
Fail
Wait Event branch (Timeout) where transaction fails
Toggle Transaction command set to **Fail**
Script fails after transaction fails

Figure 3-10 Transaction with Wait Event and Success Command



Successful result details:

Script stopped in transaction failure path.

[✓] Stop Script

3.7 Step: Proofs to Be Collected

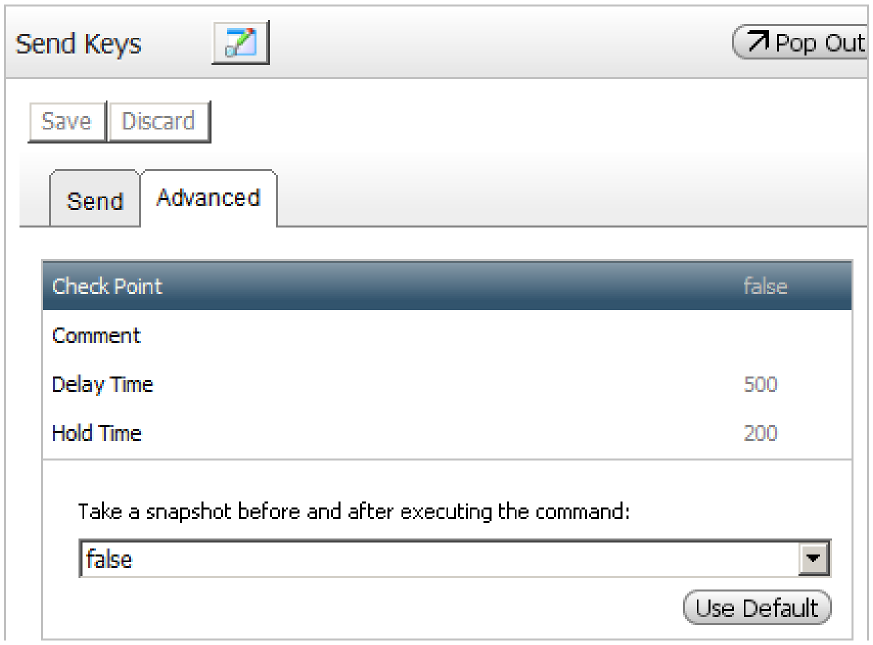
Specify proofs to be captured from various commands when your script fails at those points. Proofs are device *screenshots*, *video*, and where available, the *device log*. Proofs are displayed in detailed, step-by-step results for failed runs and can be especially useful in troubleshooting failed steps.

3.7.1 Capturing Proofs

You can specify proofs to be collected as follows:

- In the **Advanced** tab of a command, e.g., Send Keys

Set the **Check Point** control to **true**. This captures the first and last screen of the device during command execution. Enter a customized **Comment** for display in test results.

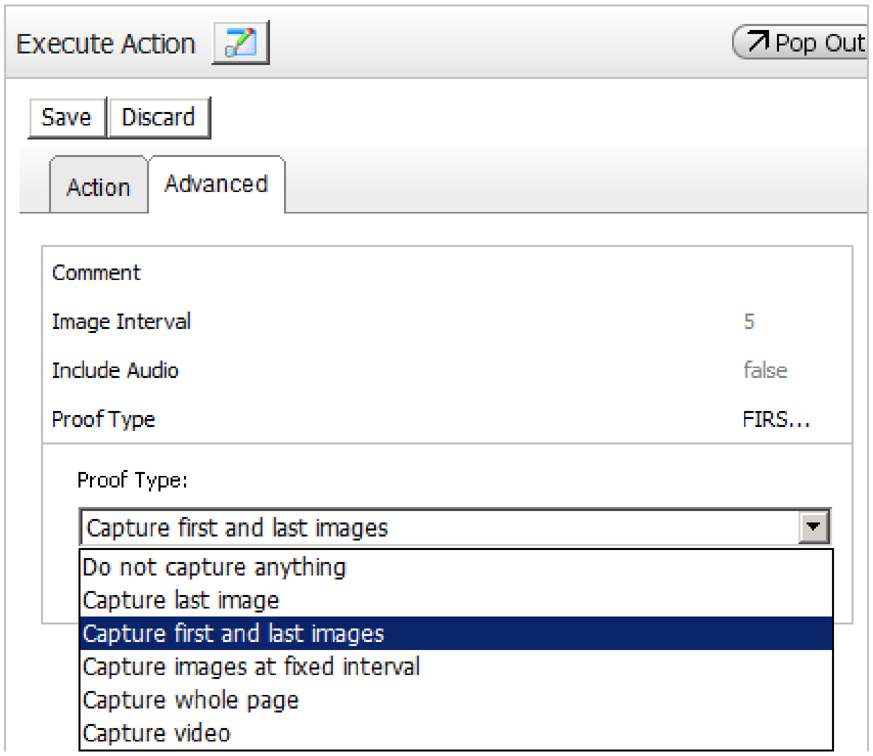


Check Point	false
Comment	
Delay Time	500
Hold Time	200

Take a snapshot before and after executing the command:

false

- In the Execute Action command to make action calls—proof settings for Execute Action are separate from proof settings for individual commands in the action being called. In test results, results for individual commands are displayed nested under those for Execute Action.



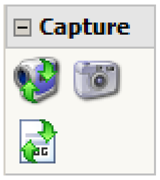
Comment	
Image Interval	5
Include Audio	false
Proof Type	FIRS...

Proof Type:

Capture first and last images

You can capture images (last image, first and last images, images at specified intervals, or a scrolling image, e.g., of a web page that is longer than the device screen) or MPEG video.

- Using scripting commands in the Capture category—use a pair of Toggle Recording commands in your script to start and stop recording video or images at a fixed interval. Capture From Device captures video/snapshots of the current device screen. Toggle Extract Log starts and stops capturing device log information.



3.7.2 Viewing Proofs

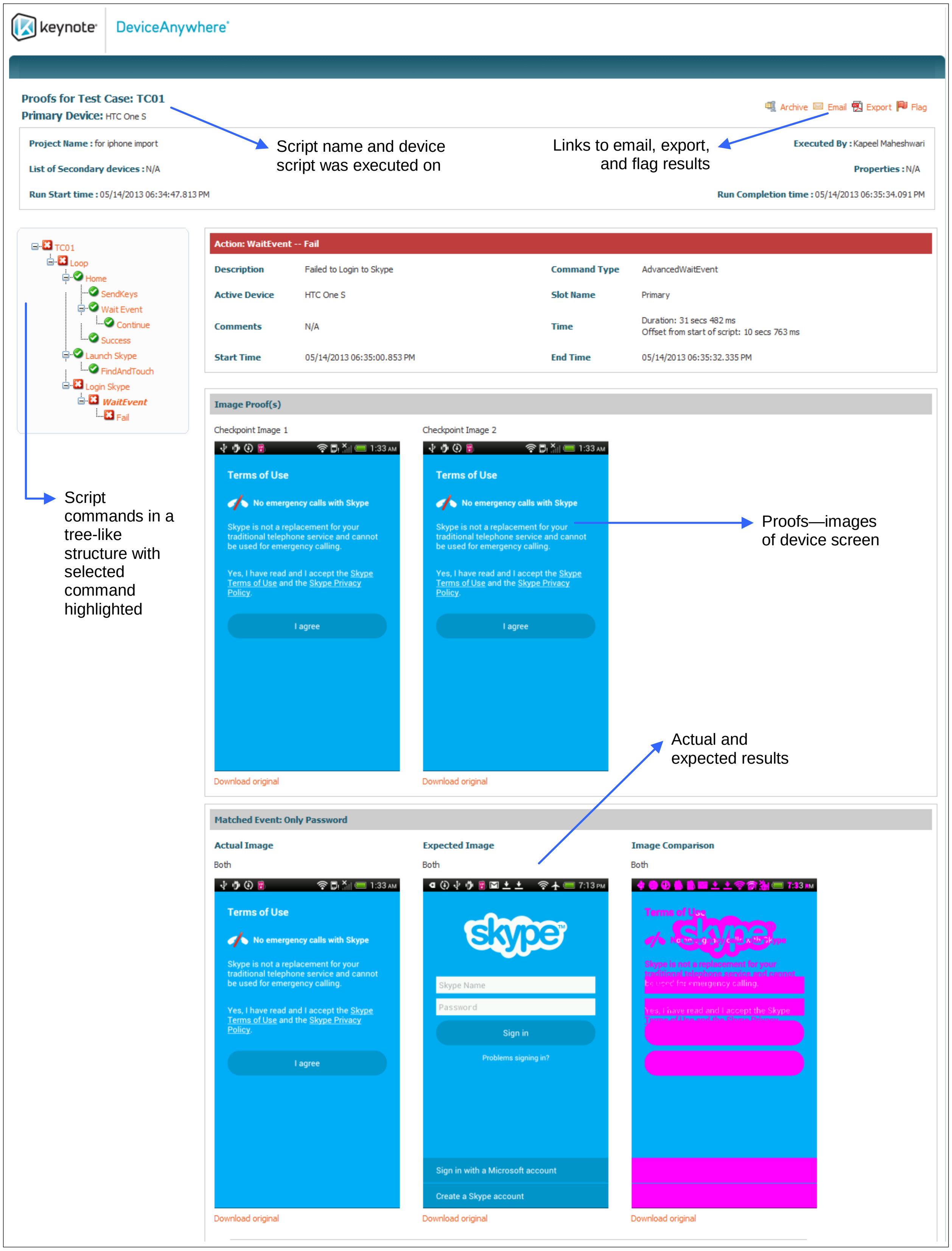
Proofs are displayed as part of detailed run results available in the DAE Monitoring Portal. Results are available for following types of failures:

- A monitor run that encountered an error as defined by script logic
- A successful monitor run but one in which transactions failed or exceeded acceptable run times
- A monitor run that encountered a system error and was therefore not completed as expected

The figure below shows the detailed results for a monitor script that calls an embedded action. The tree structure on the left displays commands within the embedded action. In this example, the script failed at an image verification step. For the command selected on the left, the right pane displays proofs as well as actual vs. expected results.

Refer to the *DAE Monitoring Portal Guide* for an explanation of accessing and interpreting detailed run results.

Figure 3-11 Detailed Results—Failed Monitor Run


Script name and device script was executed on
Links to email, export, and flag results
Script commands in a tree-like structure with selected command highlighted
Proofs—images of device screen
Actual and expected results

keynote DeviceAnywhere

Proofs for Test Case: TC01
Primary Device: HTC One S

Archive Email Export Flag

Project Name : for iphone import
List of Secondary devices : N/A
Run Start time : 05/14/2013 06:34:47.813 PM

Executed By : Kapeel Maheshwari
Properties : N/A
Run Completion time : 05/14/2013 06:35:34.091 PM

TC01
- Loop
  - Home
    - SendKeys
    - Wait Event
      - Continue
    - Success
  - Launch Skype
    - FindAndTouch
  - Login Skype
    - *WaitEvent*
      - Fail

Action: WaitEvent -- Fail

Description	Failed to Login to Skype	**Command Type**	AdvancedWaitEvent
Active Device	HTC One S	**Slot Name**	Primary
Comments	N/A	**Time**	Duration: 31 secs 482 ms Offset from start of script: 10 secs 763 ms
Start Time	05/14/2013 06:35:00.853 PM	**End Time**	05/14/2013 06:35:32.335 PM

Image Proof(s)

Checkpoint Image 1 — Checkpoint Image 2

Terms of Use
No emergency calls with Skype
Skype is not a replacement for your traditional telephone service and cannot be used for emergency calling.
Yes, I have read and I accept the Skype Terms of Use and the Skype Privacy Policy.
I agree

Download original — Download original

Matched Event: Only Password

Actual Image — **Expected Image** — **Image Comparison**

Both — Both — Both

Skype Name
Password
Sign in
Problems signing in?
Sign in with a Microsoft account
Create a Skype account

Download original — Download original — Download original

3.8 Step: Test Case

An end-to-end monitoring scenario consists of a test case composed of action and state calls with additional commands for script logic. For example, a test case might consist of viewing and deleting call records from a device or getting the weather report for a specified zip code from a website.

A test case script is valid for all project devices—test cases do not have device-specific implementations. However, you can create test case scripts for multiple-device scenarios, e.g., to send and receive a text message from one device to another.

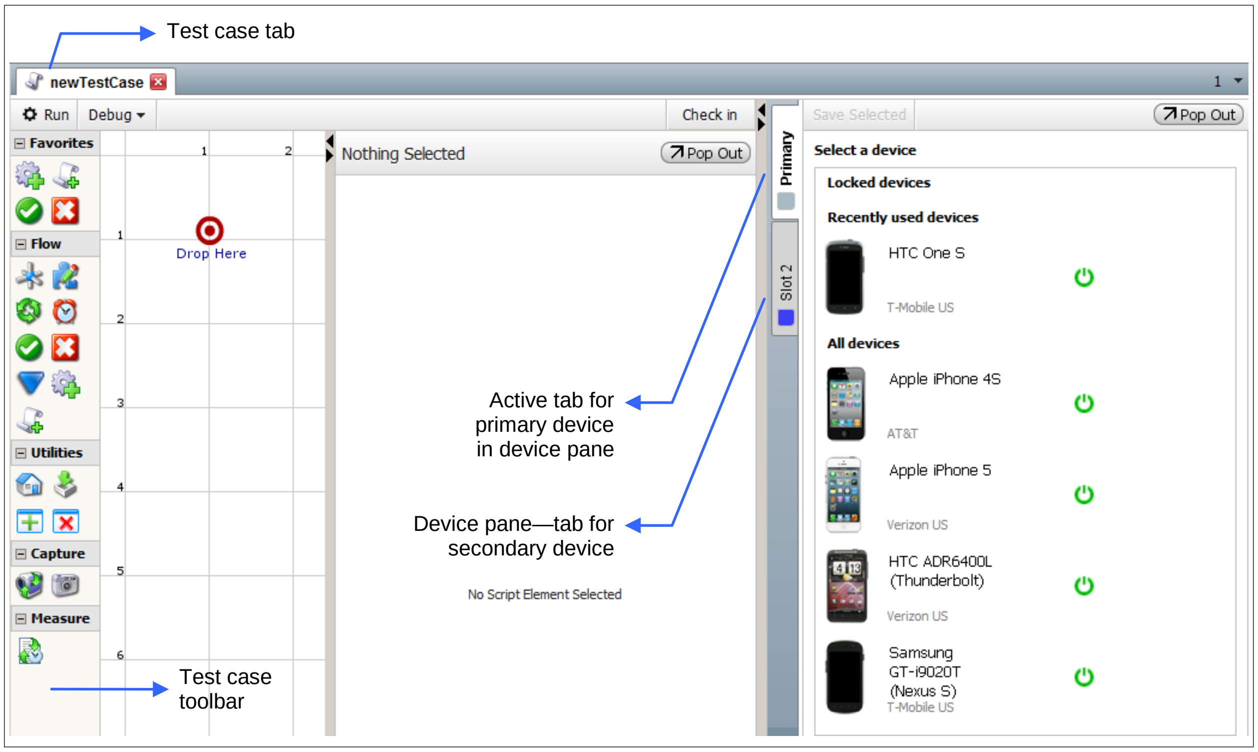
3.8.1 Creating a Test Case

Use any of these methods to create a test case from the **Scripting** tab of the Monitoring view:

- Right-click your project `test cases` folder (or sub-folder) and select **New Test Case**.
- While in your project, select **File** > **New** > **Test Case**.

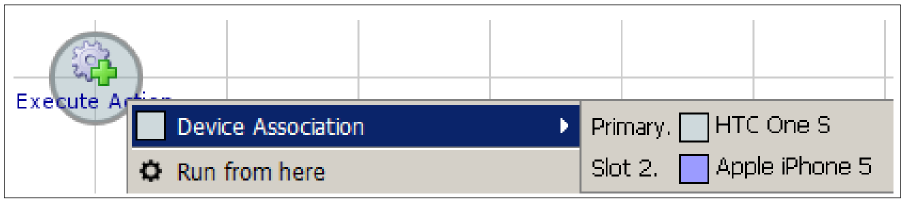
A tab for the test case is opened in the workspace. The device pane displays all project devices. In a multi-device scenario, the device pane displays a tab for each slot. For example, in a test case with a two-device scenario, the device pane contains two tabs, one each for the primary and secondary devices. Each tab lists all project devices.

Figure 3-12 New Test Case



Drag an Execute Action command onto the script canvas and use it to select a previously defined action. If constructing a multi-device test case, you must specify which device (slot) the command applies to: right-click the command > **Device Association** > select a slot.

Figure 3-13 Device Association



3.9 Step: Transactions

DAE Monitoring enables you to measure the overall performance of a monitor script as well as that of different portions of your script set up as transactions. Using transactions enables you to measure the performance and success rate of crucial aspects of your application or service, e.g., the time taken for a corporate website to load or the time taken to process a credit card payment. It also ensures that script failure at a step that is not relevant to your service does not send out false alarms.

Transaction settings can be reused, enabling you to compare the same set of interactions across different monitors, e.g., the time taken to log in to an application on three different devices. You can have multiple transactions in a monitor script.

Transaction policies establish tolerance levels for violations of expected run times as well as for the failure of transactions to be completed as expected. Generally, transactions and policies have a one-to-one relationship. You would only want to associate several transactions to a single policy when the transactions measure similar aspects of a service that you want to track together. When multiple transactions are associated with one policy, all the transactions are evaluated together. So a violation of the acceptable completion time in any one of the transactions contributes to the same incident.

3.9.1 Reasons for Using Transactions

The DAE Monitoring system does not enforce the creation and tracking of transactions; you can deploy monitors that do not use transactions. However, the use of transactions helps you to focus attention on critical application interactions in the following ways.

- You can establish expected run times in transaction settings and use this to measure the performance of key aspects of your application or service that can impact customer experience. You can then view actual run times by checking performance data in the DAE Monitoring Portal.
- You can have multiple transactions in a monitor script and collect information on the performance and success rate of each. This is especially useful if you want to compare the success rate of different interactions within your monitor script. If the transactions are independent of each other, measuring them in the same monitor script might save you time and allow you to accomplish more measurements in a monitor run (e.g., by removing the need to reset the device between transactions, if this does not affect the outcome).
- Besides exceeding acceptable run times, a transaction can also be set to fail explicitly, e.g., in a script branch where a verification command times out, or in a branch where web page verification fails because the wrong page was loaded. Use the **Fail** setting of the Toggle Transaction command in a script branch where you want a transaction to fail explicitly.

  When a transaction exceeds expected run time, it is considered to have failed, and an alert is sent out. However, script execution continues so you can also be alerted when a Toggle Transaction **Fail** command is encountered. In effect, you are alerted when your transaction exceeds acceptable performance, but can also see whether it ultimately times out or fails explicitly. For example, when you measure the performance of your website, you might want to know (through an alert) if after 10 seconds, it ultimately timed out at 20 seconds or if it failed to load entirely, say with a 404 error.

- By setting up transaction policies that are separate from monitor polices, you can separate the concepts of monitor failure (failure of the script or device) from a transaction failure (issue with your service). That way, script failure at a step that is not relevant to your service does not send out false alarms. You can separately route alerts for service issues and other script issues not directly related to your application or content. For example, you may send transaction alerts to your operations team but a monitor alert to the team that manages the DAE Monitoring deployment. (If Keynote is managing your DAE Monitoring environment, all monitor alerts would be routed to Keynote support.)
- Transactions are also tracked independently in the DAE Monitoring Portal, and you can find both device-independent and device-specific metrics on transaction *performance (completion time)* and *availability (success vs. failure)*.

3.9.2 What Transactions Consist Of

Transactions are used to delimit command sequences for key interactions with your application, e.g., the time taken to load a web page, or the time taken to log in to an application.

You would not set up routine interactions such as resetting a device to the home screen as transactions—the success of failure of these operations have no bearing on the performance of your mobile application or service.

3.9.3 Creating Transactions

A transaction is created and implemented in two steps:

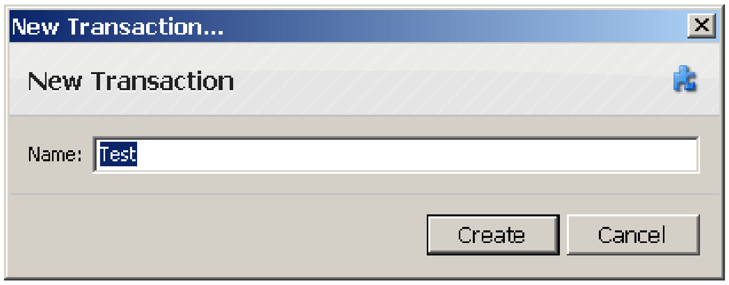
- Naming and setting up a run time for the transaction in the **Scheduling** tab
- Applying the named transaction to a script sequence using the Toggle Transaction command

3.9.3.1 Creating a Named Transaction

To create a named transaction in the **Scheduling** tab:

1 Right-click the `transactions` folder of your project and select **New Transaction**.

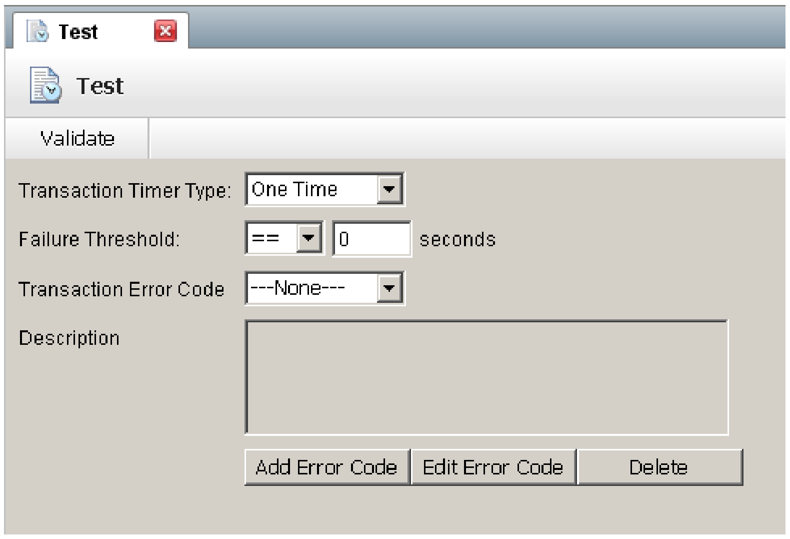
2 Enter a **Name** for the transaction and click **Create**.


New Transaction...

New Transaction

Name: Test

The transaction template opens up in a tab in the workspace.



Transaction Timer Type: One Time

Failure Threshold: == 0 seconds

Transaction Error Code ---None---

Description

3 Select a **Transaction Timer Type**:

- **One Time**—This collects run time information once from a pair of start and stop Toggle Transaction commands.
- **Summation**—Use this type of timer if you are looping through a set of commands nested between a pair of start and stop Toggle Transaction commands and you want a summary of run times. For example, you might use a loop to insert multiple contacts in your address book and want to time the length of the entire process, from entering the first contact to the last.
- **Average**—Use this type timer if you are looping through a set of commands nested between a pair of start and stop Toggle Transaction commands and you want average run time. For example, you might use a loop to insert multiple contacts in your address book and want to know the average time it took to enter a single contact.

4 Define the **Failure Threshold**—transactions with run times that are <operator> <value> **seconds** will be considered failures. For example, to specify an expected run time of 10 seconds or less, set the failure threshold to **> 10**. If the time taken to complete the transaction exceeds your failure threshold, this failure is evaluated towards a transaction policy violation.

NOTE The script itself continues to run even after this threshold is crossed and might be completed successfully, or fail or time out at a command.

5 Create and use a **Transaction Error Code**. To create an error code, click **Add Error Code**. Then select it from the **Transaction Error Code** drop-down list. The transaction error codes you create in any transaction are available for all transactions.

6 **Check In** your transaction. Automatic validation ensures that all fields are filled out.

3.9.3.2 Toggle Transaction Command

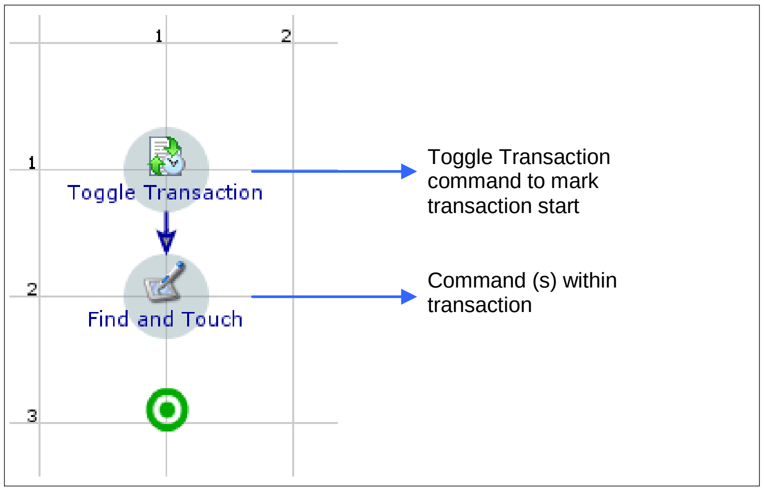
Next, you must actually apply the named transaction (and its expected run time) to a script sequence using the Toggle Transaction command. Toggle Transaction commands delineate a transaction by marking start and end/failure points. They reference a named transaction and its expected run time (see Creating a Named Transaction). The run time of the script sequence between the start and end/failure points is then measured and compared to the expected run time.

NOTE You can use the Toggle Transaction command to reuse a named transaction across multiple monitors within your project. For example, you might have two monitors, one that checks a balance, and another that executes a stock trade. Both monitors have a step to launch and log in to the same application. These steps can utilize the same transaction (and action containing commands for application launch and login).

To specify transaction start:

1 Open and check out your script in the **Scripting** tab of the Monitoring view.

2 Drag the Toggle Transaction command above the first command of the script sequence you wish to set up as a transaction. This will start the timer for the transaction during execution.


1
2
1
Toggle Transaction
2
Find and Touch
3
Toggle Transaction command to mark transaction start
Command (s) within transaction

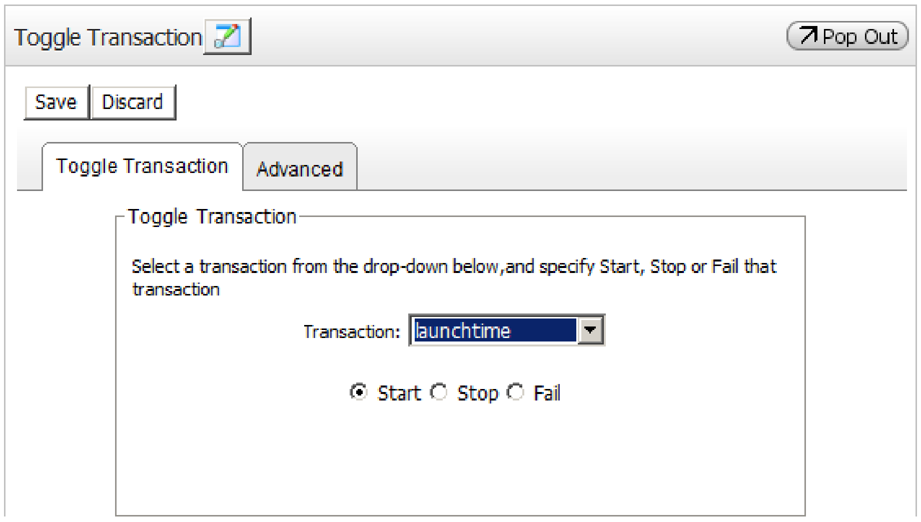
3 Double-click to open the Toggle Transaction command and set command properties.

4 Select the named **Transaction** you wish to use.

5 Select the **Start** radio button.

6 **Save** your command.

Figure 3-14 Toggle Transaction (Start)



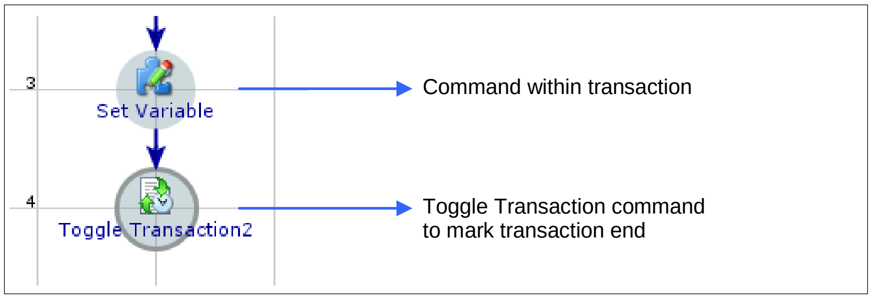
Select a transaction from the drop-down below,and specify Start, Stop or Fail that transaction

Transaction: launchtime

[✓ Start] Stop Fail

To specify transaction endpoint:

1 Drag a Toggle Transaction command below the last command of the script sequence you wish to set up as a transaction. This will stop the transaction timer during execution.


3
Set Variable
4
Toggle Transaction2
Command within transaction
Toggle Transaction command to mark transaction end

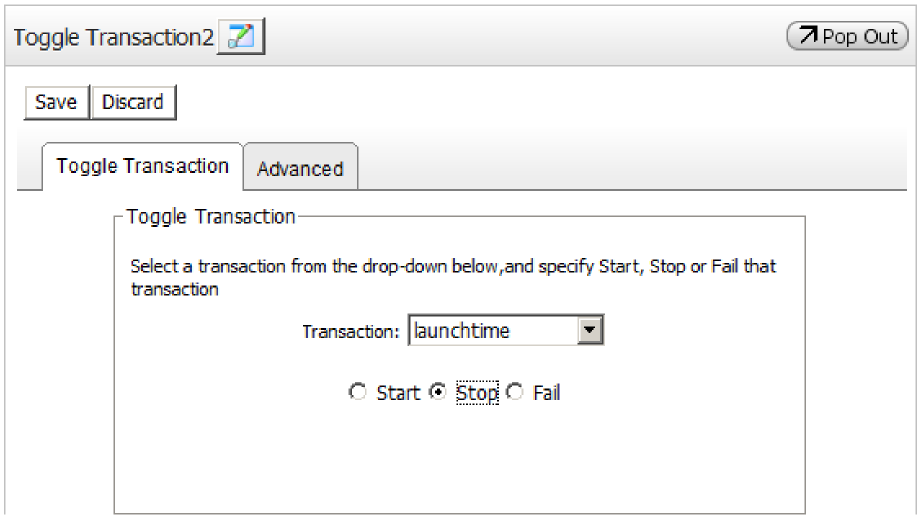
2 Double-click to open the Toggle Transaction command and set command properties.

3 Select the named **Transaction** you wish to use.

4 Select the **Stop** radio button.

5 **Save** your command.

Figure 3-15 Toggle Transaction (Stop)



Toggle Transaction

Select a transaction from the drop-down below,and specify Start, Stop or Fail that transaction

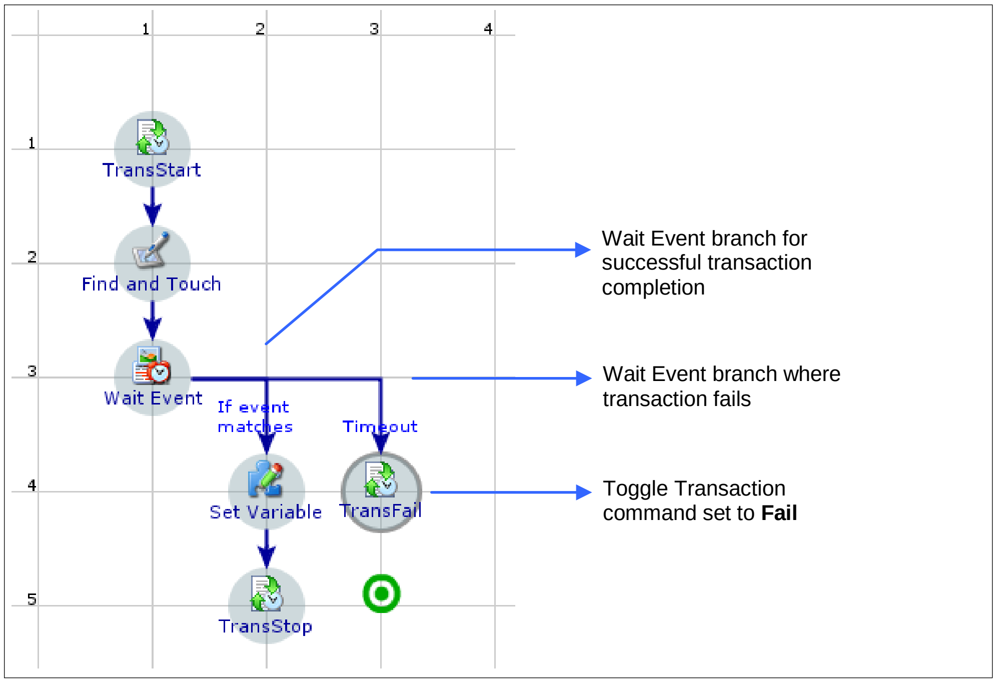
Transaction: launchtime

Start [✓ Stop] Fail

Transactions can fail either if they exceed expected run time or if you use the Toggle Transaction command to specify a failure path. For example, your transaction might consist of a Wait Event command with multiple branches, one of which you want to designate as the failure path for the transaction. If the script takes this path during execution, the transaction is considered a failure, regardless of its run time.

To specify a transaction failure path:

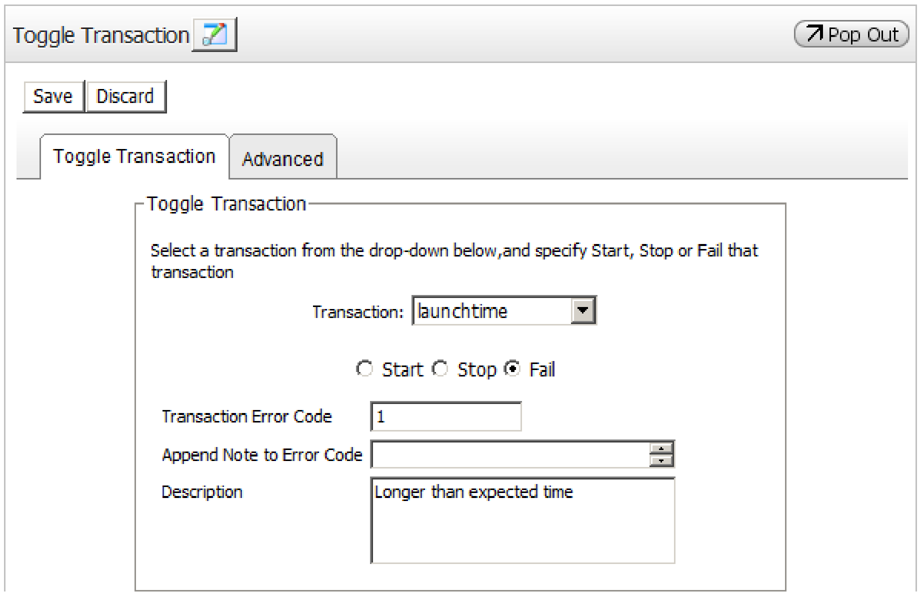
1 Drag a Toggle Transaction command to the point at which you want your transaction to fail. This will fail the transaction during execution.


1
2
3
4
1
2
3
4
5
TransStart
Find and Touch
Wait Event
If event matches
Timeout
Set Variable
TransFail
TransStop
Wait Event branch for successful transaction completion
Wait Event branch where transaction fails
Toggle Transaction command set to **Fail**

2 Double-click to open the Toggle Transaction command and set command properties.

3 Select the named **Transaction** you wish to use.

4 Select the **Fail** radio button. The associated **Transaction Error Code** (see Creating a Named Transaction) is displayed. You cannot edit the error code or its description.



Select a transaction from the drop-down below,and specify Start, Stop or Fail that transaction

Transaction: launchtime

Start Stop [✓ Fail]

Transaction Error Code	1
Append Note to Error Code	
Description	Longer than expected time

5 You can insert a Fail command below the Toggle Transaction command to fail the script and trigger an appropriate application-specific error type (see Guidelines for Transactions below). You can also insert a Success command and check the **Stop Script** box—this stops the script without triggering an error.

6 **Save** your command.

3.9.4 Guidelines for Transactions

Creating transactions:

- In general, associate a single transaction with a transaction policy. You would only want to associate several transactions to one policy when the transactions measure similar aspects of a service that you want to track together. When multiple transactions are associated with one policy, all the transactions are evaluated together. So a violation of the acceptable completion time in any one of the transactions contributes to the same incident.

Using transactions:

- Create and use transactions to help you to focus on critical interactions that are relevant to your mobile product. You can do so by establishing expected run times, using transaction policies, and by viewing transaction results in the DAE Monitoring Portal.
- As transactions are project-wide assets, they are reusable. To generate meaningful comparative data, e.g., the time taken to log in to an application on three different devices, reuse a named transaction to delimit the same interaction across multiple monitors.
- Your transaction might contain a branch where you want to reset the transaction timer, i.e., start again. Insert a transaction start marker again; the first start marker is ignored if the script takes this particular branch.
- If you do not insert a transaction end marker, the transaction timer continues till the end of monitor script execution, generating invalid data.
- You can set multiple end points (Toggle Transaction **Stop**) for a transaction, as in multiple branches of a Wait Event command. Insert only one end point in any branch.
- You can insert multiple failure points (Toggle Transaction **Fail**) for a transaction, as in multiple branches of a Wait Event command.

Transactions containing verifications:

- Use verifications in transactions—very often, your transaction will consist only of a verification command and its branches.
- Use Wait Event with logic for success/fail branches for verifications in transactions. Wait Event enables you to define a combination of reference points as the basis for creating script branches, e.g., if a reference image is found, the script takes the associated branch. You can call a pre-defined state from Wait Event. This command is useful when there are multiple possible outcomes for a command sequence, and a different course must be followed depending on the outcome.
- In verifications within transactions, trigger application-specific error types that indicate an issue with your service, application, or content.
- If you set a Toggle Transaction command to **Fail**, follow this in most cases with a Fail scripting command so you can fail the script and trigger error reporting.
  - If your script continues after transaction failure, it might fail farther down the line, as script sequences often depend on preceding commands being completed successfully. Script failure farther down the line is more difficult to diagnose when looking at results.
  - The error triggered is reported with other error types in monitor details in the DAE Monitoring Portal.

Do not fail the script only if subsequent transactions do *not* depend on the previous transaction.

- If you set a Toggle Transaction command to **Fail**, you can follow this with a Success command and check the **Stop Script** box. This stops the script without triggering an error.
- If your transaction threshold (e.g., > 60 seconds) is less than your verification timeout (e.g., 120 seconds), you will receive a transaction alert when the expected run time (60 seconds) is exceeded. When the verification times out (120 seconds), you will receive a monitor alert if the error type triggered is associated with the monitor policy. To receive a transaction alert when the verification times out, set the Toggle Transaction command to **Fail** in that script branch (see Toggle Transaction Command above).

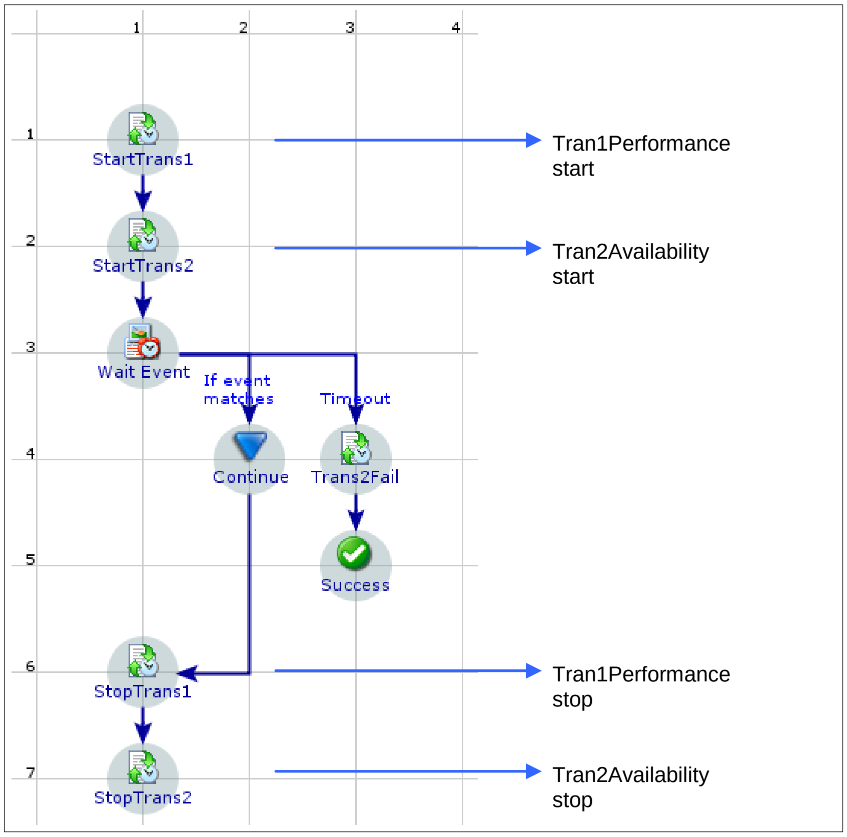
NOTE Transaction alerts do not differentiate between transaction performance violation (> 60 seconds) and outright failure (explicit failure in a script branch or timing out at 120 seconds).

- To receive different alerts for performance violation and transaction availability:

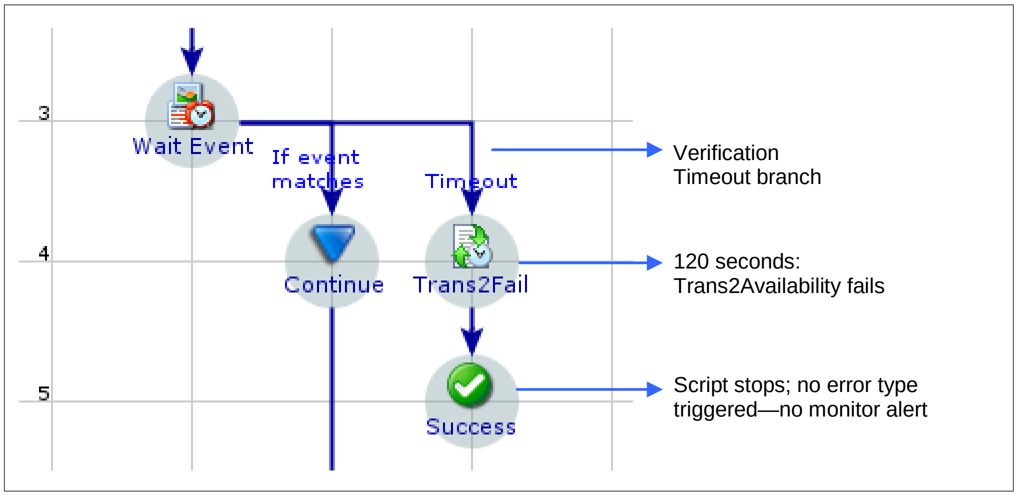
  a Create two transactions: one with a performance threshold lower than the verification timeout, the other with a threshold equal to or greater than the verification timeout.

Transaction	Failure Threshold	Verification Timeout
Trans1Performance	> 60 seconds	120 seconds
Trans2Availability	≥ 120 seconds	

  b Wrap both transactions around the same verification—you will need to insert two start transaction commands, one for each transaction. Likewise you will need to insert two end transaction commands. This is shown in the script below:



c In the Timeout branch of the verification (Wait Event), insert a transaction failure command referring to Trans2Availability (failure threshold ≥ 120 seconds).


3
4
5
Wait Event
If event matches
Timeout
Continue
Trans2Fail
Success
Verification Timeout branch
120 seconds: Trans2Availability fails
Script stops; no error type triggered—no monitor alert

When a performance threshold of 60 seconds is violated, you will receive an alert for Trans1Performance. When the verification times out at 120 seconds, you will receive an alert for Trans2Availability. Trans2Availability will never generate a performance alert, as its threshold is equal to or great than the verification timeout. To ensure that you do not receive a monitor alert, use the Success command with **Stop Script** checked in the Timeout branch of Wait Event.

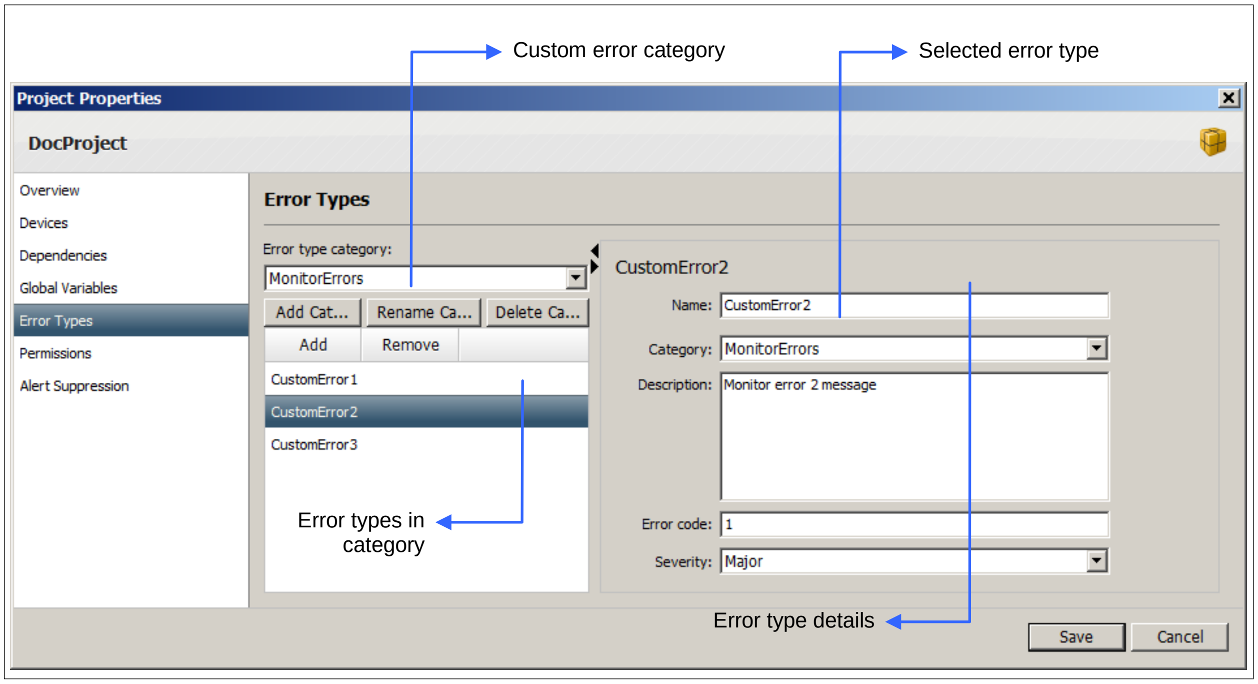
3.10 Step: Error Definitions in Project Properties

DAE Monitoring enables you to create project-wide error definitions and then call them in various commands in your scripts to generate error reporting when your script fails.

3.10.1 Description

The error management system consists of *error categories* containing *error types*, created in the **Error Types** tab of the Project Properties dialog box (right-click a project in the project directory > **Properties**).

*Figure 3-16 Project Properties—**Error Types** Tab*



Error type category: MonitorErrors

Name: CustomError2

Category: MonitorErrors

Description: Monitor error 2 message

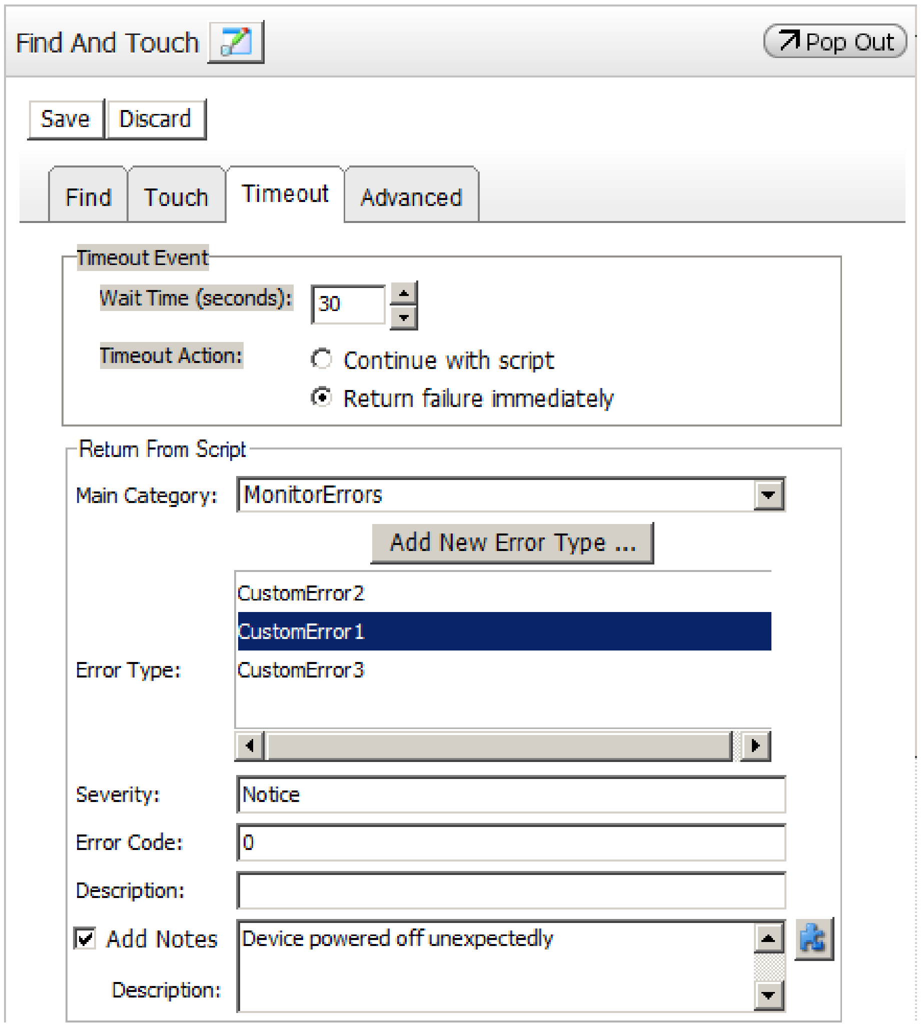
Error code: 1

Severity: Major

When you have defined error types, you can implement them by calling them from commands at various points in your scripts. You can select the error triggered and append notes to its description in the following commands:

- Find and Touch
- Wait Event
- Web Element
- Web Wait
- Web Form
- Web Touch
- Fail

Figure 3-17 Selecting Error Category and Type in Find and Touch



Timeout Event

Wait Time (seconds): 30

Timeout Action: ( ) Continue with script [✓ Return failure immediately]

Return From Script

Main Category: MonitorErrors

Error Type: CustomError2 [✓ CustomError1] CustomError3

Severity: Notice

Error Code: 0

Description:

[✓] Add Notes Description: Device powered off unexpectedly

3.10.2 Guidelines for Error Definitions

Creating and using error types is not enforced in DAE Monitoring. You can deploy a monitor that does not use error types. However, you will not be able to define a monitor policy (and trigger alerts) for it, and results in the monitor details report will only display the overall success vs. failure percentages—you will not be able to see a breakdown of failure by error encountered.

NOTE Refer to the *DAE Monitoring Portal Guide* for a detailed description of monitor results.

- To make optimized use of the DAE Monitoring system and generate meaningful results, create custom error categories and error types. Without error types, you will generate very limited monitoring data, and will not be able to implement monitor policies that trigger alerts.
- Create the following custom error categories (which you can refine and add to during the second pass of scripting):
  - Category for errors *directly related to the application/service/content* you are monitoring—with error types for failures you wish to be alerted about, e.g., application web page does not load, login credentials rejected, diverted to incorrect page.

- Category for errors in the general monitor scenario—this covers *errors not directly related to your application or service* and possibly contains error types for device issues (e.g., application is not installed, screen powered off) or network issues (e.g., unable to connect to Internet).

When implementing error types in your scripts:

- Do not use error types in the *default DeviceAnywhere error category*—these are reserved for automatically generated system errors.
- Use an error type at every point in your script where you can do so, e.g., in verifications.
- Set your script to fail if an error is triggered, as subsequent interactions are generally dependent on the successful completion of preceding commands. If your script continues after triggering an error, it might fail farther down the line, which is more difficult to diagnose from results.
- Use error types to correctly indicate the type of error, i.e., use application-related error types in transactions and at other points to indicate an application problem; use general error types in all other places.
- When finalizing monitor policy settings in the second pass of this workflow, associate only those general (non-application) error types that you wish to be alerted on.

NOTES The monitor details report displays all errors encountered, not just those associated with the monitor policy.

You can also create transaction errors when creating a transaction. These errors can be used in transaction alerts.

3.11 Step: Variables

Variables allow you to set/store values in your script to be used as the basis for script logic, to specify device input, or to define a string of reference text. Variables can be *global* or *script specific*:

- *Script variables* are script specific, i.e., they are not available for use outside the test case or action in which they are created.
- *Global variables* are defined at the project level and can be used in any project script. The value stored in a global variable in one script can be used in another project script that is part of the same run session.

You can create script or global variables that refer to entire data sets instead of a single value. The data set can either be created/entered in DeviceAnywhere Studio or imported in CSV format from an external source.

The Loop command can then be associated with the variable and used to loop iteratively through values from the data set.

NOTES Do not use action or test case *parameters* in your script, as you can only provide one default value for all scheduled monitor runs—you cannot dynamically update the parameter value for each run. If you need to cycle through a set of values, use a data set with a variable instead.

Refer to the *DAE Automation User Guide* for detailed information on creating and using variables.

3.12 Step: Validate and Debug Scripts

Before creating and deploying a monitor script, you can run project- or script-level validation from DeviceAnywhere Studio. Ad hoc runs enable you to debug scripts before scheduling a monitor.

3.12.1 Validation

Validation flags errors such as:

- Circular references, e.g., two projects that depend on each other
- Project build errors
- References to entities that do not exist, e.g., calling an action that has been deleted
- References to scripts that are not implemented, e.g., calling an action that is not implemented for the chosen device
- Invalid reference images, e.g., using a reference image from one device for another device with a different screen size
- Undefined reference images, e.g., an empty Wait Event command
- Keys not mapped for a given key mode, e.g., sending a text string in Send Keys in the Numeric key mode

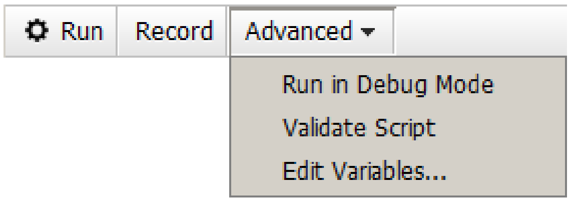
Validation flags issues as:

- Errors—will cause a script to fail if not fixed.
- Warnings—might cause a script to fail and should also be fixed.

To run project-level validation, right-click your project in the project list and select **Validate All Files**.

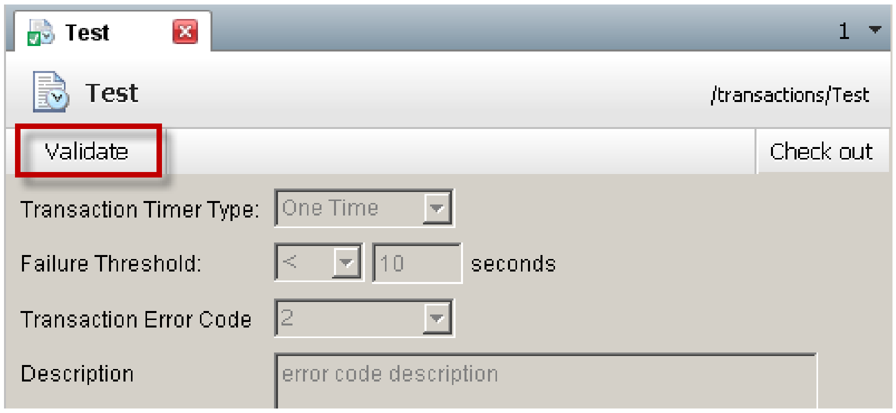
For script-level validation, check your script out and select **Advanced** > **Validate Script** above the script canvas.

Figure 3-18 Script-Level Validation



Assets created in the **Scheduling** tab are automatically validated when checked in. You can also click the **Validate** button in the top-left corner of the tab to run validation.

Figure 3-19 To Validate a Transaction



Transaction Timer Type: One Time

Failure Threshold: < 10 seconds

Transaction Error Code 2

Description error code description

3.12.2 Debug Runs

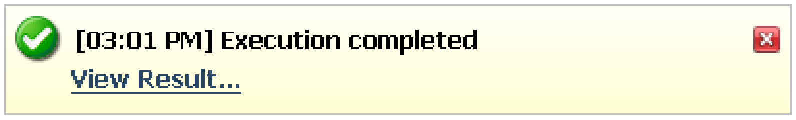
The MonitorAnywhere view offers several options for ad hoc script runs:

- Click **Run** above the script canvas to run your script (action or test case).
- Click **Advanced** > **Run in Debug Mode** above the script canvas to run your script in debug mode. This opens any embedded scripts (called using the Execute Action command) in separate tabs as they are being executed.
- In a state, you can click **Detect** to test that the reference text or image can be found on the device screen. This ensures that you have defined your state correctly.
- You can perform a partial run (checked out scripts only) by right-clicking a command in the script canvas and choosing **Run from here**. This runs the script from the selected command and is useful when writing a test script to run through recently added commands.

NOTE You do not need to check out a script in order to execute it.

After a script (action implementation or test case) has been executed (or stopped), a result bar above the script canvas displays whether the run has succeeded or failed.

Figure 3-20 Result Bar—Success

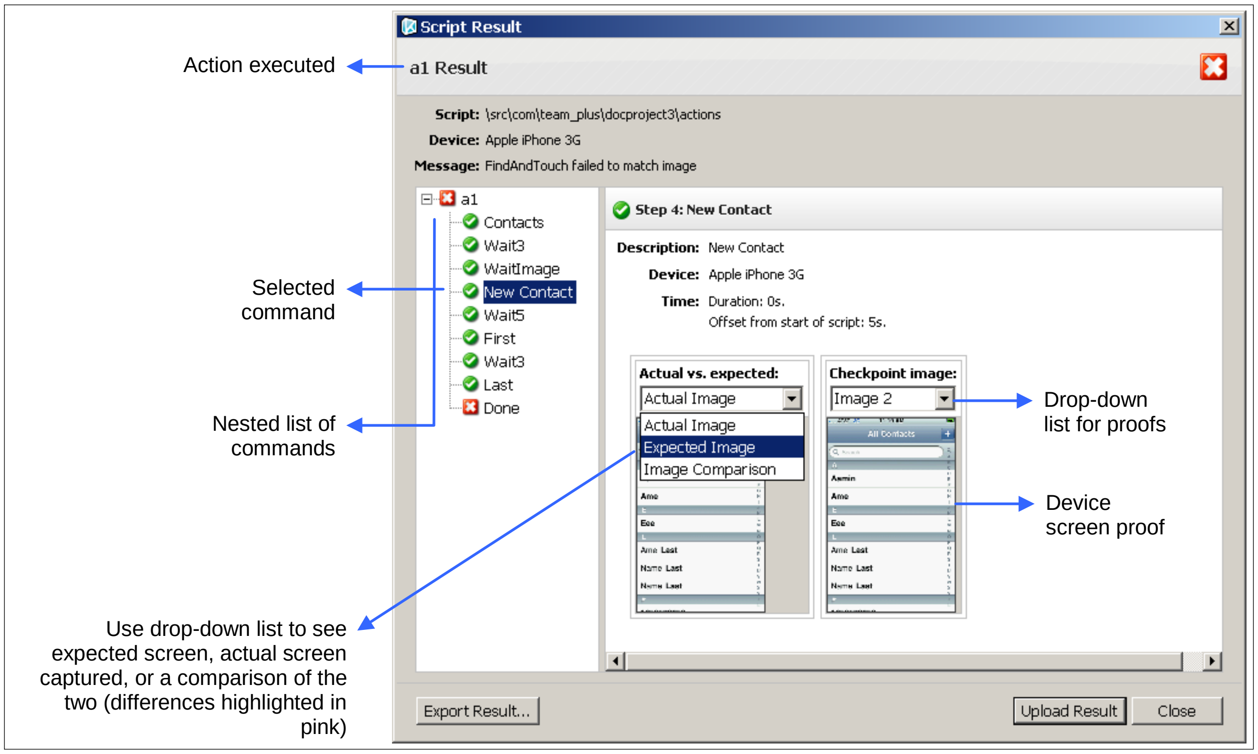


[03:01 PM] Execution completed

View Result...

Click **View Result** in the result bar to view step-by-step results with screenshots in a separate DeviceAnywhere Studio window. These results can be uploaded and accessed from `<DAE Monitoring Portal address>/ResultsPortal.aspx`.

Figure 3-21 Viewing Ad Hoc Run Results in DeviceAnywhere Studio



Script: \src\com\team_plus\docproject3\actions
Device: Apple iPhone 3G
Message: FindAndTouch failed to match image

Step 4: New Contact

Description: New Contact
Device: Apple iPhone 3G
Time: Duration: 0s.
Offset from start of script: 5s.

3.13 Step: Monitor Schedule

Creating and scheduling a monitor is performed in the **Scheduling** tab. A monitor is defined as a test case scheduled to run on a monitor server and a selected device (or multiple devices, one for each slot, in the case of a multi-device test case).

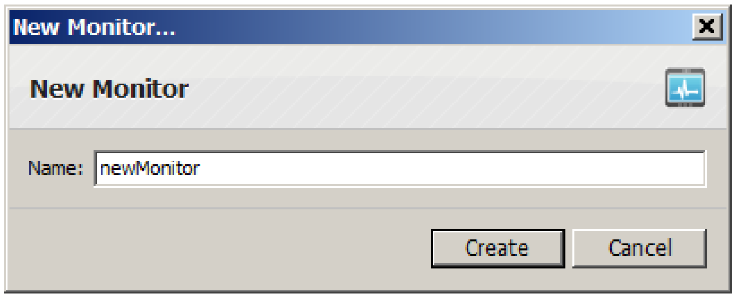
3.13.1 Creating a Monitor Schedule

To create a monitor in the **Scheduling** tab:

1 Navigate to the **Scheduling** tab of the Monitoring view.

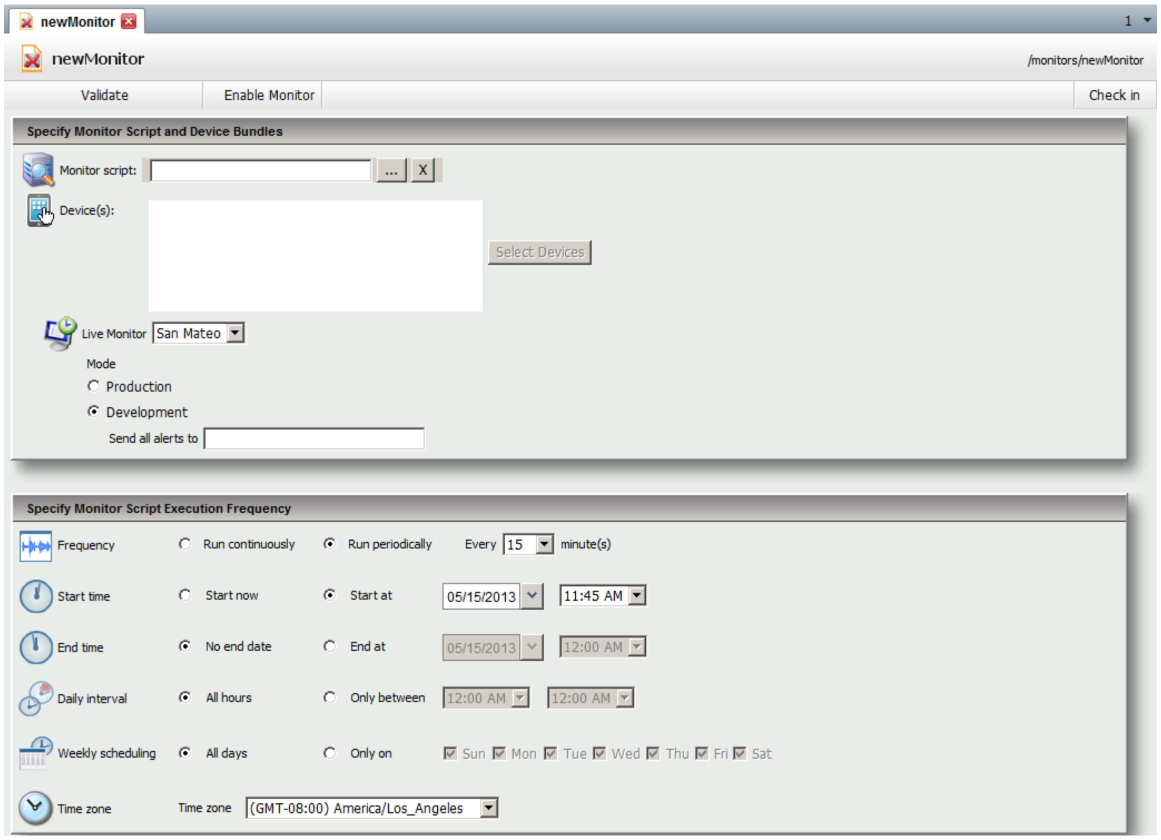
2 Right-click the `monitors` folder in your project and select **New Monitor**.

3 Enter a **Name** for the monitor and click **Create**.



Name: newMonitor

The monitor template opens up in a tab in the workspace. The script icon indicates that the monitor is not yet enabled.



Specify Monitor Script and Device Bundles

Monitor script:
Device(s):
Select Devices
Live Monitor San Mateo
Mode
( ) Production
[✓ Development]
Send all alerts to

Specify Monitor Script Execution Frequency

Frequency ( ) Run continuously [✓ Run periodically] Every 15 minute(s)
Start time ( ) Start now [✓ Start at] 05/15/2013 11:45 AM
End time [✓ No end date] ( ) End at 05/15/2013 12:00 AM
Daily interval [✓ All hours] ( ) Only between 12:00 AM 12:00 AM
Weekly scheduling [✓ All days] ( ) Only on ✓ Sun ✓ Mon ✓ Tue ✓ Wed ✓ Thu ✓ Fri ✓ Sat
Time zone Time zone (GMT-08:00) America/Los_Angeles

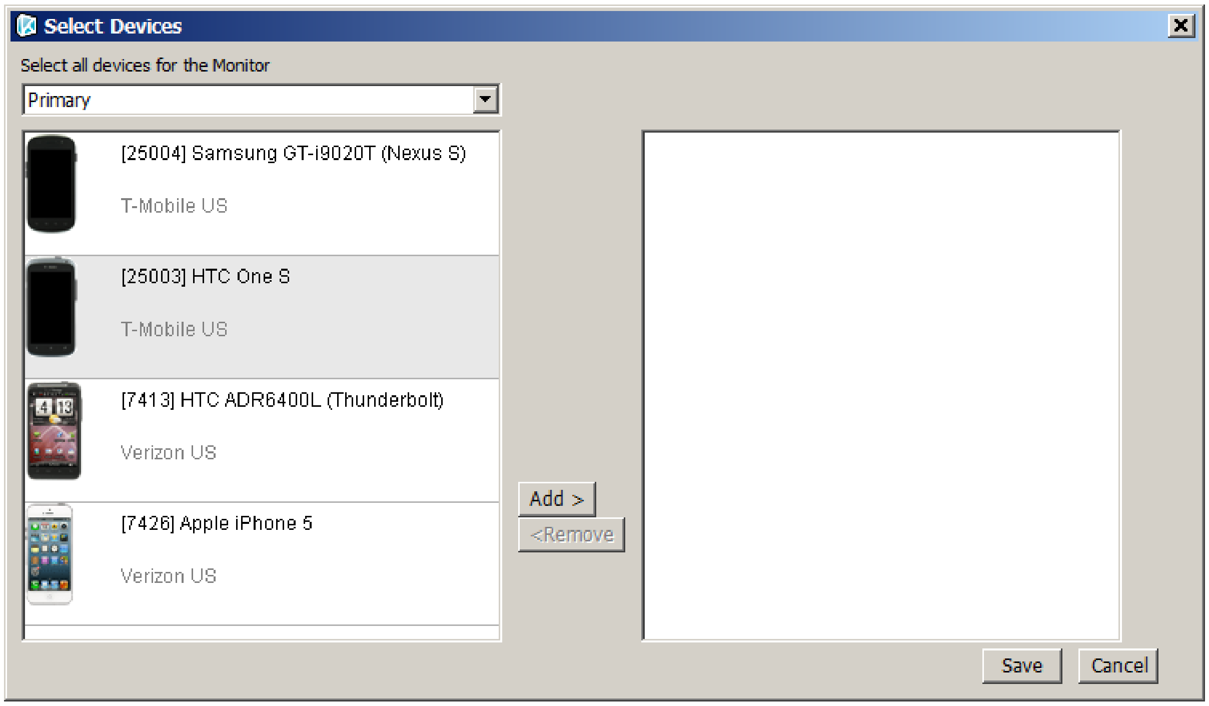
4 Select a **Monitor script**—click the ellipsis button ... to view a list of available test cases.

5 Click **Select Devices**. In the dialog box that appears,

a Choose a slot.

b Select one device per slot in the left pane and click **Add**.

c **Save** your changes.



[25004] Samsung GT-i9020T (Nexus S)
T-Mobile US

[25003] HTC One S
T-Mobile US

[7413] HTC ADR6400L (Thunderbolt)
Verizon US

[7426] Apple iPhone 5
Verizon US

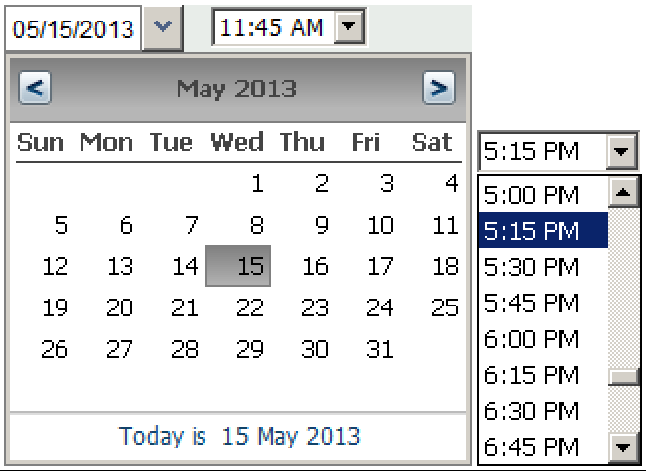
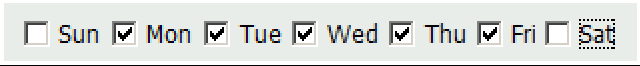
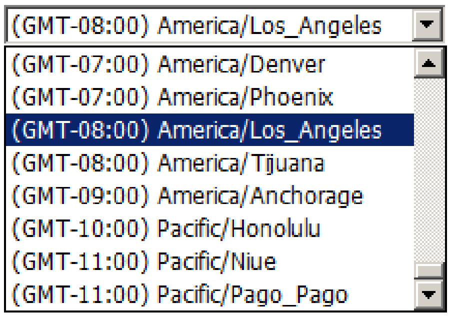
6 Select a monitor server from the **Live Monitor** list.

7 Select the **Development** mode radio button. This enables you to re-route alerts while testing the monitor.

When you redeploy the monitor in production mode, you can opt to view either development or production runs in the DAE Monitoring Portal.

8 Schedule your monitor. The table below describes scheduling controls.

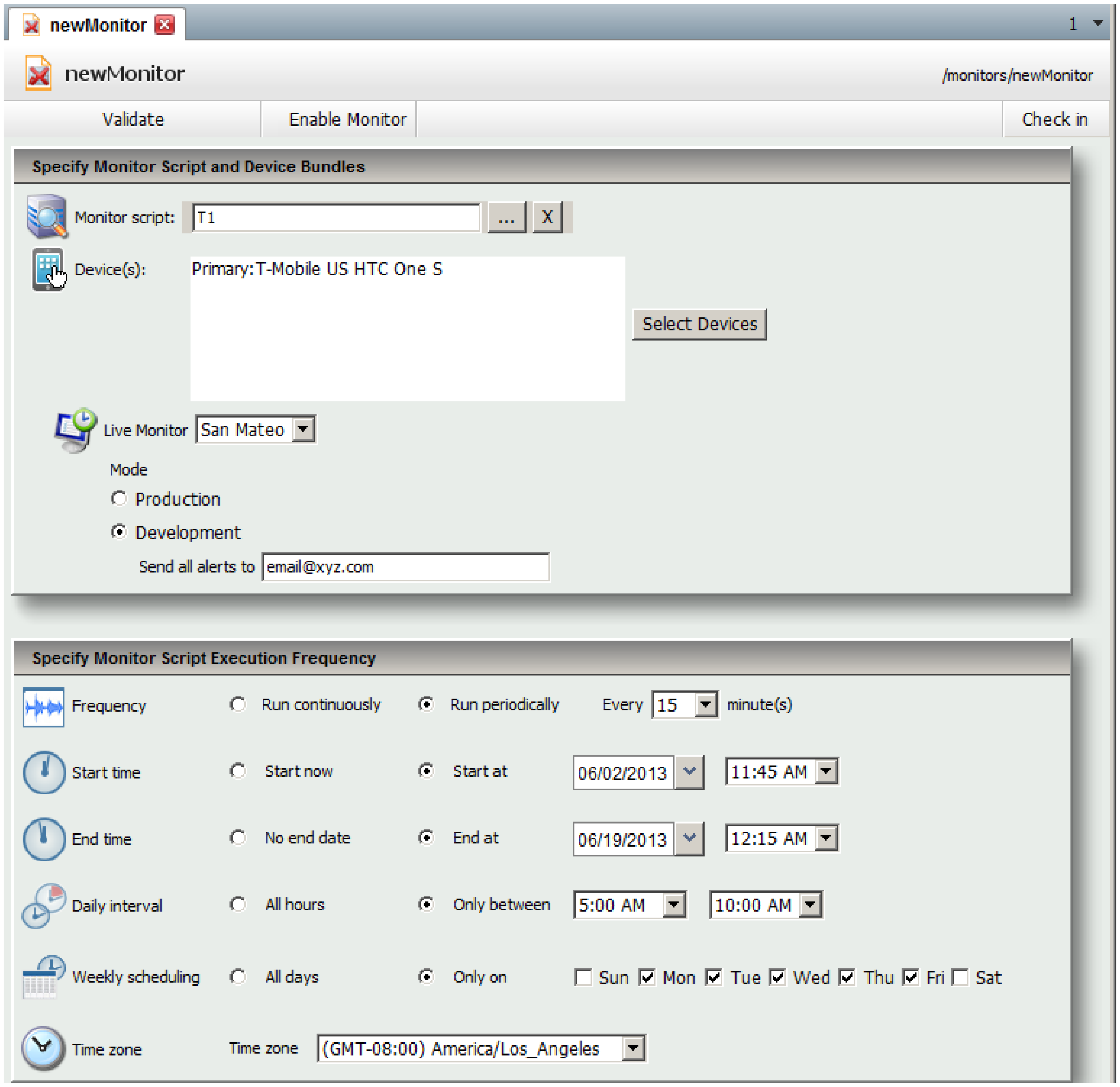
Control	Field	Description
Frequency	**Run continuously**	Select to have your monitor executed continuously after start. Each run begins as soon as the previous run ends.
	Run periodically	Select to specify a recurring run schedule at specific intervals. Choose an interval from the drop-down list provided. Choose an interval that is larger than your expected monitor run time.
Start time	**Start now**	Select to start the monitor immediately.

Control	Field	Description
	Start at	Select to specify a start time. Choose the start date from the drop-down calendar. Then choose a start time. Monitors can be started every 15 minutes on the quarter hour.  05/15/2013 11:45 AM May 2013 Sun Mon Tue Wed Thu Fri Sat 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Today is 15 May 2013 5:15 PM 5:00 PM 5:15 PM 5:30 PM 5:45 PM 6:00 PM 6:15 PM 6:30 PM 6:45 PM
End time	**No end date**	Select to run the monitor indefinitely until disabled.
	End at	Select to specify a finite run schedule. Choose the end date from the drop-down calendar. Choose an end time. You can specify a cutoff on every quarter hour—no monitor runs will begin after the end time. 03/10/2013 12:15 AM
Daily Interval	**All hours**	Select to execute the monitor at the frequency specified during all hours of the day.
	Only between	Select to execute the monitor at the frequency specified only during fixed hours of the day. Choose the start hour and the end hour. 5:00 AM 10:00 AM
Weekly scheduling	**All days**	Select to execute the monitor at the frequency specified on all days of the week during the hours specified.
	Only on	Select the days of the week on which to execute the monitor.  ☐ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri ☐ Sat
Time zone		Select a time zone—start and end times are for this time zone. **NOTE** Results are displayed in the DAE Monitoring Portal in the time zone of the logged in user. This time zone is set when creating the user account.  (GMT-08:00) America/Los_Angeles (GMT-07:00) America/Denver (GMT-07:00) America/Phoenix (GMT-08:00) America/Los_Angeles (GMT-08:00) America/Tijuana (GMT-09:00) America/Anchorage (GMT-10:00) Pacific/Honolulu (GMT-11:00) Pacific/Niue (GMT-11:00) Pacific/Pago_Pago

9 **Check in** your monitor. It is automatically validated.

The figure below shows completed settings for a monitor schedule before it is enabled.

Figure 3-22 Monitor Schedule



Specify Monitor Script and Device Bundles

Monitor script: T1

Device(s): Primary:T-Mobile US HTC One S

Live Monitor: San Mateo

Mode: ( ) Production [✓ Development]

Send all alerts to: email@xyz.com

Specify Monitor Script Execution Frequency

Frequency	Run continuously	[✓ Run periodically]	Every 15 minute(s)
Start time	Start now	[✓ Start at]	06/02/2013 11:45 AM
End time	No end date	[✓ End at]	06/19/2013 12:15 AM
Daily interval	All hours	[✓ Only between]	5:00 AM 10:00 AM
Weekly scheduling	All days	[✓ Only on]	☐ Sun ☑ Mon ☑ Tue ☑ Wed ☑ Thu ☑ Fri ☐ Sat
Time zone	Time zone	(GMT-08:00) America/Los_Angeles	

3.13.2 Monitor Guidelines

When creating and scheduling a monitor during the first pass of scripting:

- Set your monitor to run in development mode so you can redirect any alerts from actual intended recipients.
- Choose an execution frequency that takes into account expected monitor run time. If you schedule a monitor to run every 15 minutes but notice that it is executed every half hour, it could be that your run time exceeds 15 minutes or that you have scheduled another monitor to run on the same device.
- Choose a higher frequency than eventually intended or run your monitor continuously so you have more information available in the DAE Monitoring Portal for troubleshooting.

3.14 Step: Monitor Policy

Optionally in the first pass of scripting, set up a monitor policy for your monitor. A monitor policy establishes tolerance levels for triggering associated error types in a given number of script runs. Monitor policies support sending out different alerts for up to three levels of escalation.

Although you can deploy your monitor without a policy, you can set up a rudimentary policy with a single level of escalation to ensure that incidents are being tracked correctly.

3.14.1 Creating a Monitor Policy

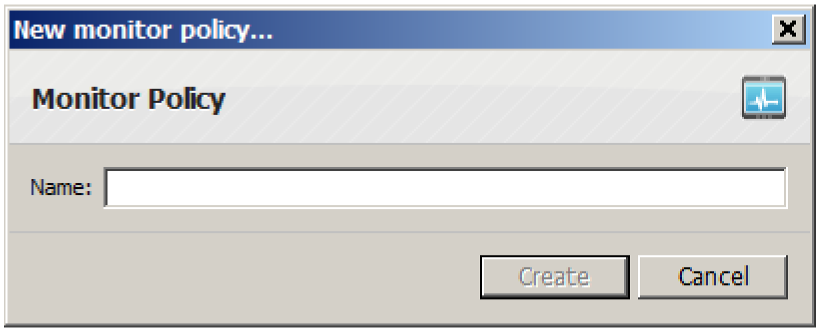
You must create and use error types in your scripts before you can set up a monitor policy. If you create error types but do not insert them into your scripts, they will not be triggered and will not generate any reporting or incidents even if associated with a monitor policy.

All error types encountered during monitor runs are reported in the monitor details report in the DAE Monitoring Portal, whether or not they are associated with a monitor policy.

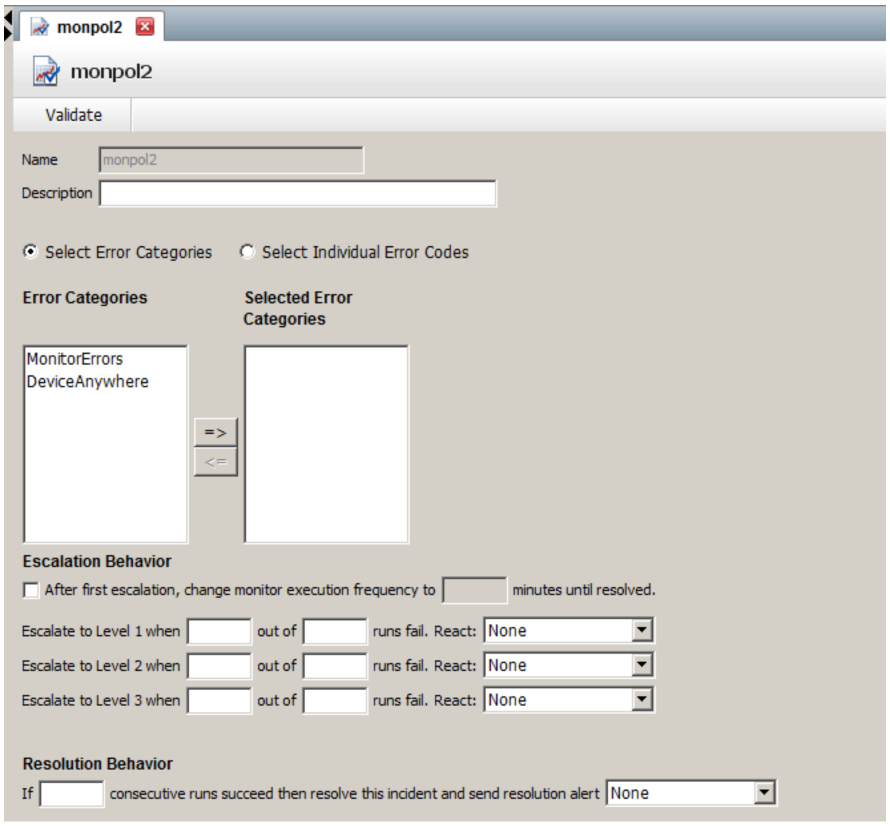
To create a monitor policy in the **Scheduling** tab:

1 Right-click the `monitor policies` folder of your project and select **New monitor policy**.

2 Enter a **Name** for the monitor policy and click **Create**.



The monitor policy template opens up in a tab in the workspace.



Name monpol2
Description

[✓ Select Error Categories] Select Individual Error Codes

Error Categories: MonitorErrors, DeviceAnywhere

Selected Error Categories:

Escalation Behavior

After first escalation, change monitor execution frequency to minutes until resolved.

Escalate to Level 1 when out of runs fail. React: None

Escalate to Level 2 when out of runs fail. React: None

Escalate to Level 3 when out of runs fail. React: None

Resolution Behavior

If consecutive runs succeed then resolve this incident and send resolution alert None

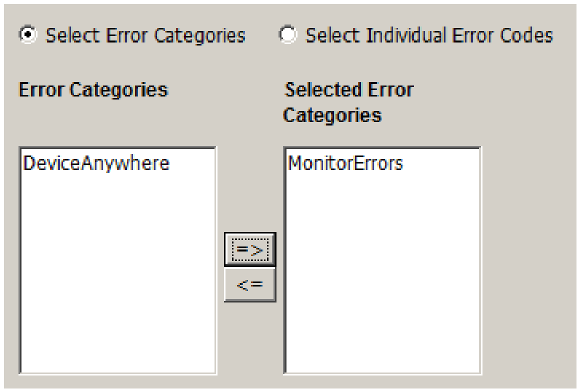
3 Enter a **Description** for the policy. As a best practice, use this space to summarize tolerance thresholds for monitor failures, e.g., 2 out 5 runs.

4 You can **Select Error Categories** or **Select Individual Error Codes** to be associated with the policy. If you select an error category, all error types in it are associated with the policy.

a Select **Select Error Categories**.

b Select an error category from the left pane.

c Use the directional arrow to move it to the right pane.



[✓ Select Error Categories] Select Individual Error Codes

Error Categories: DeviceAnywhere

Selected Error Categories: MonitorErrors

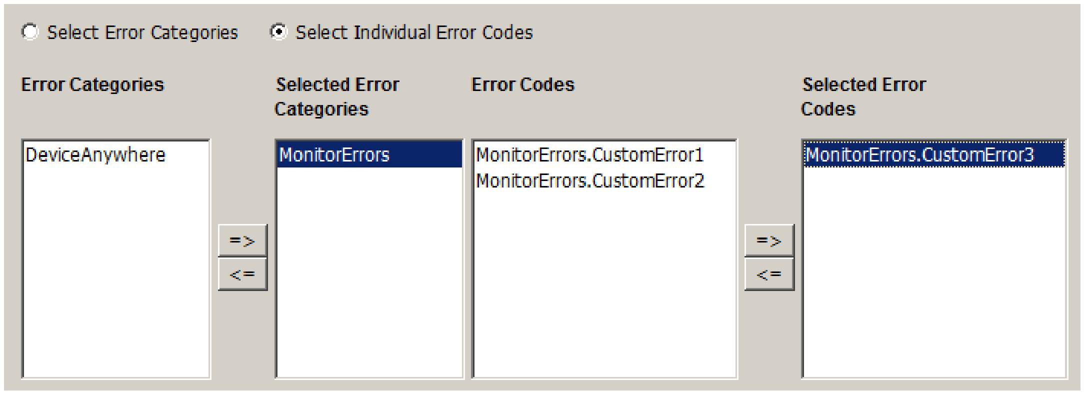
Alternatively, you can select the specific error types to associate with the policy.

a Select **Select Individual Error Codes**.

b Select an error category from the left pane.

c Use the directional arrow to move it to the right pane. **Error Codes** (error types) in the category are displayed.

d Choose **Error Codes** (error types) from the category and use the directional arrow to move them to the **Selected Error Codes** pane.

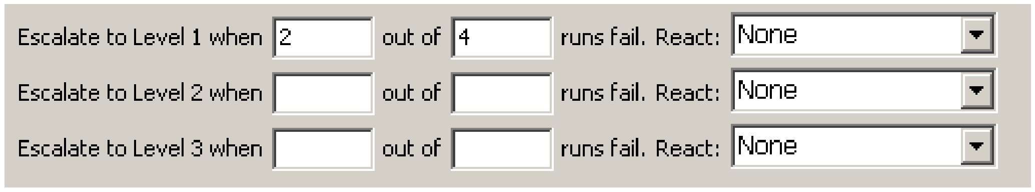


Select Error Categories [✓ Select Individual Error Codes]

Error Categories	Selected Error Categories	Error Codes	Selected Error Codes
DeviceAnywhere	MonitorErrors	MonitorErrors.CustomError1	MonitorErrors.CustomError3
		MonitorErrors.CustomError2	

In the first scripting pass, you can associate all custom error types in your script with the policy. Do not select the DeviceAnywhere category as it is reserved for automatically generated system errors.

2 Specify escalation behavior for a single level of policy violation—you must choose the number of failed runs out of a given number of runs that constitute a violation. A failed run is one in which associated error types are triggered. In the image below, a single level of policy violation is defined as 2 failed runs out of 4.



Escalate to Level 1 when 2 out of 4 runs fail. React: None

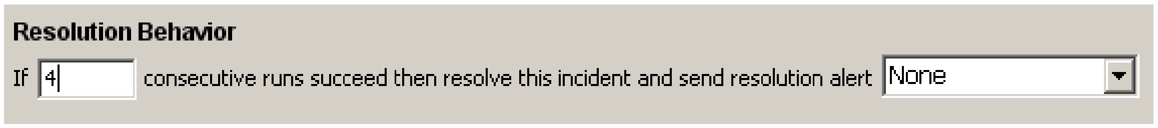
Escalate to Level 2 when out of runs fail. React: None

Escalate to Level 3 when out of runs fail. React: None

3 Select **None** from the **React** drop-down list. This implies that no alerts will be sent when an incident is triggered. (This is flagged by validation as a warning, but you can still deploy a monitor using this policy.)

4 Specify **Resolution Behavior**—you must enter the number of consecutive successes required to resolve an incident. The number of runs must be equal to or greater than the sample size used when establishing performance levels. In this instance, resolution requires 4 or more consecutive successes.

If you do not specify a resolution, the number of runs required to resolve a Level 1 escalation automatically resolves the incident (in the example above, 3 consecutive successful runs).



Resolution Behavior

If 4 consecutive runs succeed then resolve this incident and send resolution alert None

5 Select **None** from the **React** drop-down list. This implies that no alerts will be sent when an incident is resolved. (This is flagged by validation as a warning, but you can still deploy a monitor using this policy.)

6 **Check In** your monitor policy. Automatic validation ensures that fields are filled out correctly.

3.14.2 Monitor Policy Guidelines

- When creating a monitor policy, use a naming convention that includes the project and identifies it as a monitor policy, e.g., WebAppMPolicy1.
- In the monitor description, summarize the tolerance thresholds for monitor failures, e.g., 2-3-4 of 5 runs.
- In the first pass of scripting, associate all error types in your script with the monitor policy to ensure that errors are reported correctly in monitor reports and incidents are generated correctly.
- In the first pass of scripting, define just one level of violation/escalation in the monitor policy.
- In the first pass of scripting, you need not trigger any alerts for an incident or its resolution. (This is flagged by validation as a warning, but you can still deploy a monitor using this policy.)
- If a level 1 violation is defined as 3 failed runs out of 6, and 3 out of the first 4 runs have failed, the system triggers an incident immediately; it does not wait to complete 6 runs.
- The number of runs in resolution criteria must be equal to or greater than the sample size used when establishing performance levels. For example, if a level 1 violation is defined as 2 out of 6 failed runs, then you must set the resolution criteria to 6 or more consecutive successful runs.

3.15 Step: Deploy Monitor

Before deploying a monitor, you must check in all scripts and publish your project (right-click the project > **Publish Project**). Then open your monitor and click **Enable Monitor** at the top of the tab. This deploys the monitor. Your monitor does not need to be checked out to be enabled.

You can make changes to your project at any time while monitors from the project are deployed. However, you must re-publish the project for changes to take effect. Republishing a project with live monitors has the effect of resolving any open incidents.

3.16 Step: View Dashboard

As soon as your monitor is published, it should appear in the dashboard of the DAE Monitoring Portal, regardless of when its first scheduled run begins. If your monitor does not appear in the dashboard, check to make sure that you have published your project and enabled your monitor.

Monitors appear in the dashboard with the following status icons:

Table 3-1 Monitor Status Icons and Descriptions

Status and Icon	Description
○ PENDING	Displayed when a monitor is enabled, before the first run in the monitor schedule.
🟢 RUNNING	Displayed when a monitor script is currently being executed on the chosen device.
🟡 RECURRING	Displayed between scheduled runs of a monitor. The next scheduled run time is also displayed.
🔵 COMPLETE	Displayed when a monitor has completed all scheduled runs.

Refer to the *DAE Monitoring Portal Guide* for more information on using the dashboard.

4 Scripting Workflow: Round Two

The second pass of the DeviceAnywhere Enterprise Monitoring workflow consists mainly of reviewing initial run results in the DAE Monitoring Portal with a view optimizing your scripts, alerts, and reporting by reworking error definitions, scripts, and transaction run times as required.

This is enabled by "soaking" your monitor or running it several times to generate a number of results to help with troubleshooting.

If you haven't already, you must create alerts, transaction policies, and monitor policies. Policies are fully built out with up to three levels of escalation and associated alerts. Finally, you deploy monitors in production mode and track monitoring data.

4.1 Step: Review Initial Results in Portal

Review the following data in the DAE Monitoring Portal to diagnose failures and obtain a clearer picture of error reporting:

- Results for failed runs—check types of failures and proofs
- Monitor details report—check the errors triggered
- Performance charts—check transaction run times

4.1.1 Detailed Results for Failed Runs and Proofs

As mentioned in Proofs to Be Collected in Scripting Workflow: Round One, detailed results with proofs are available in the portal for the following types of failures:

- A monitor run that encountered an error as defined by script logic
- A successful monitor run but one in which transactions failed or exceeded acceptable run times
- A monitor run that encountered a system error and was therefore not completed as expected

If you find that a large number of run results are available for successful monitor runs, but ones in which transactions failed, you might want to:

1 Review transaction performance charts.

2 Adjust transaction failure threshold definition or run times.

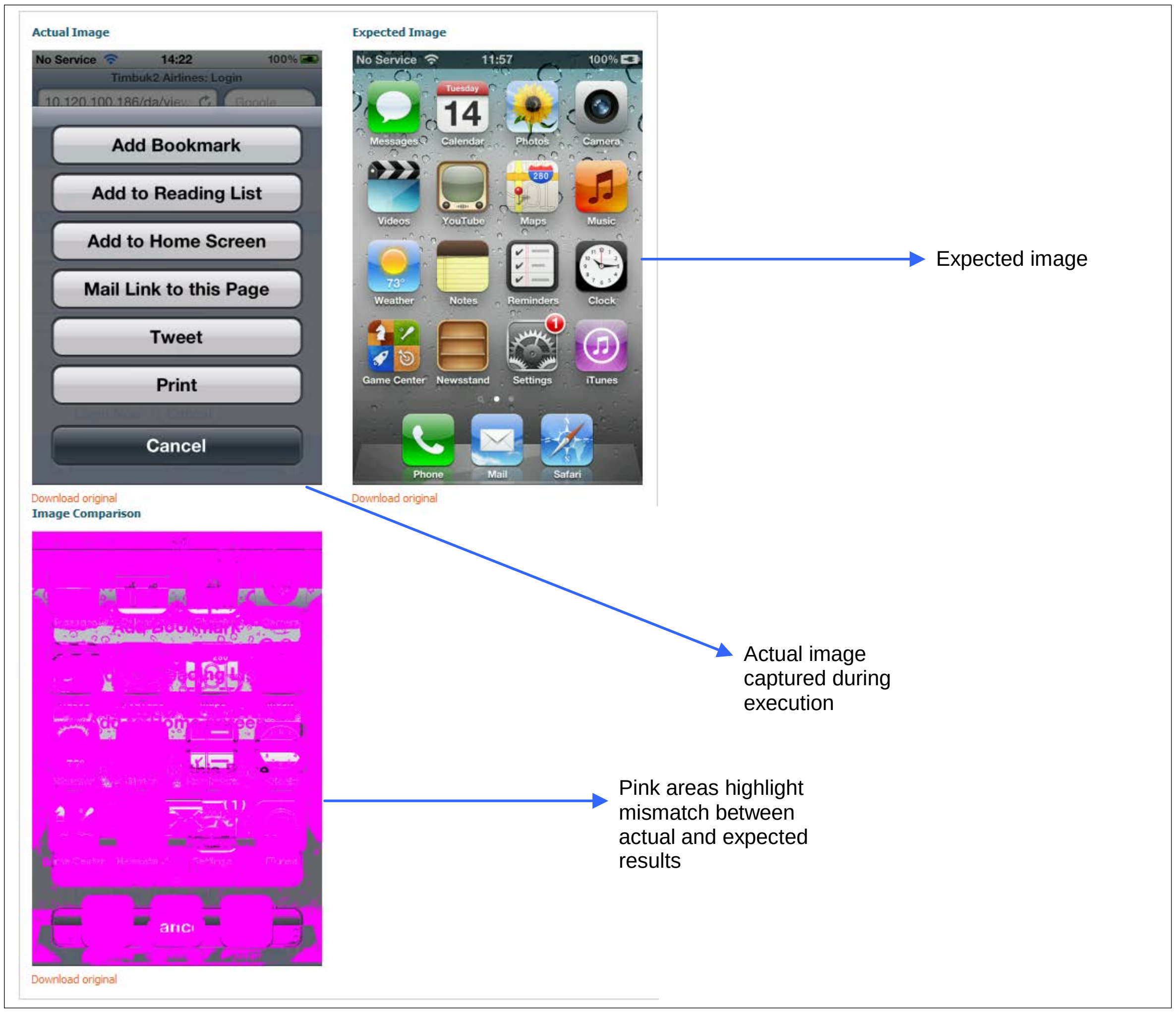
Review results for failed runs and accompanying proofs to see why the script might be failing. If you have set your script to fail at every point an error is triggered, then diagnosing script failure is easier (see Error Definitions in Project Properties). Script failure farther down the line is more difficult to diagnose from results.

- Sometimes, a script might fail if the device screen is not updated in pace with the script, requiring script adjustments. You should be able to tell from the proofs captured for failed scripts whether a device needs to "catch up."
- Proofs for failed verifications might reveal errors in defining reference points, requiring script adjustments.

- Proofs might also indicate a failure path that you have not accounted for in your script, possibly requiring changes to error definitions.

The image below shows proofs for a failed step: expected results (as defined in an image-based reference point), actual screen compared to the reference point during run time, and a comparison of the two. Pink highlights indicate areas of mismatch between expected and actual results.

Figure 4-1 Detailed Proofs for a Failed Step



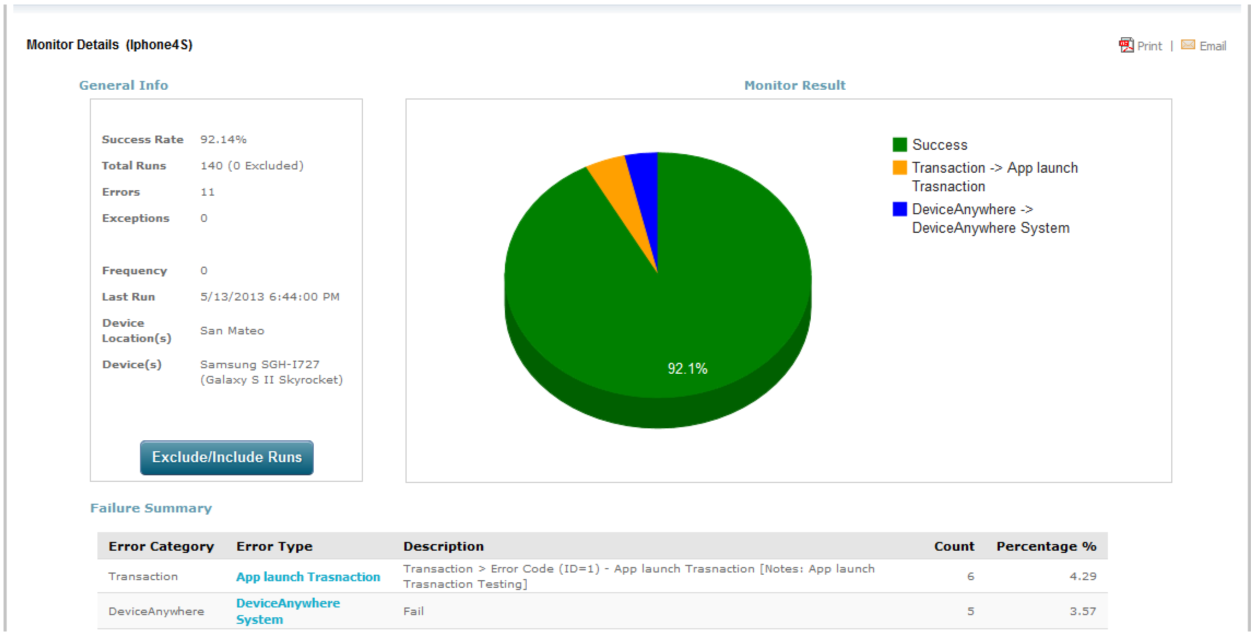
4.1.2 Monitor Details

Review monitor details to see a comprehensive listing of all errors triggered during monitor runs.

- If you haven't already created a monitor policy, you can look at the errors triggered in the monitor details report and decide which of them should be associated with the policy.
- The list of triggered errors might reveal inadequate error descriptions or errors that have mistakenly not been added to scripts, requiring changes to error types and how they are called from scripts.

The image below shows the error summary from the monitor details report—a pie chart visually represents success rate and rate of errors over a given date range. Errors encountered are also listed.

Figure 4-2 Error Reporting in Monitor Details



Monitor Details (Iphone4S)

Success Rate	92.14%
Total Runs	140 (0 Excluded)
Errors	11
Exceptions	0
Frequency	0
Last Run	5/13/2013 6:44:00 PM
Device Location(s)	San Mateo
Device(s)	Samsung SGH-I727 (Galaxy S II Skyrocket)

🟩 Success
🟧 Transaction -> App launch Trasnaction
🟦 DeviceAnywhere -> DeviceAnywhere System

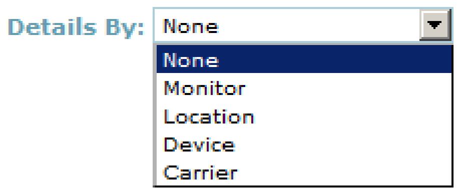
Failure Summary

Error Category	Error Type	Description	Count	Percentage %
Transaction	App launch Trasnaction	Transaction > Error Code (ID=1) - App launch Trasnaction [Notes: App launch Trasnaction Testing]	6	4.29
DeviceAnywhere	DeviceAnywhere System	Fail	5	3.57

4.1.3 Performance Charts

Review transaction run times to see if you need to adjust transaction settings. To view transaction run times (performance) in a chart:

1. Navigate to the **Transactions** tab in the DAE Monitoring Portal.
2. Check the box next to the transaction for which you would like to view performance data.
3. You can opt to view performance **Details By** monitor, location, device, or carrier.

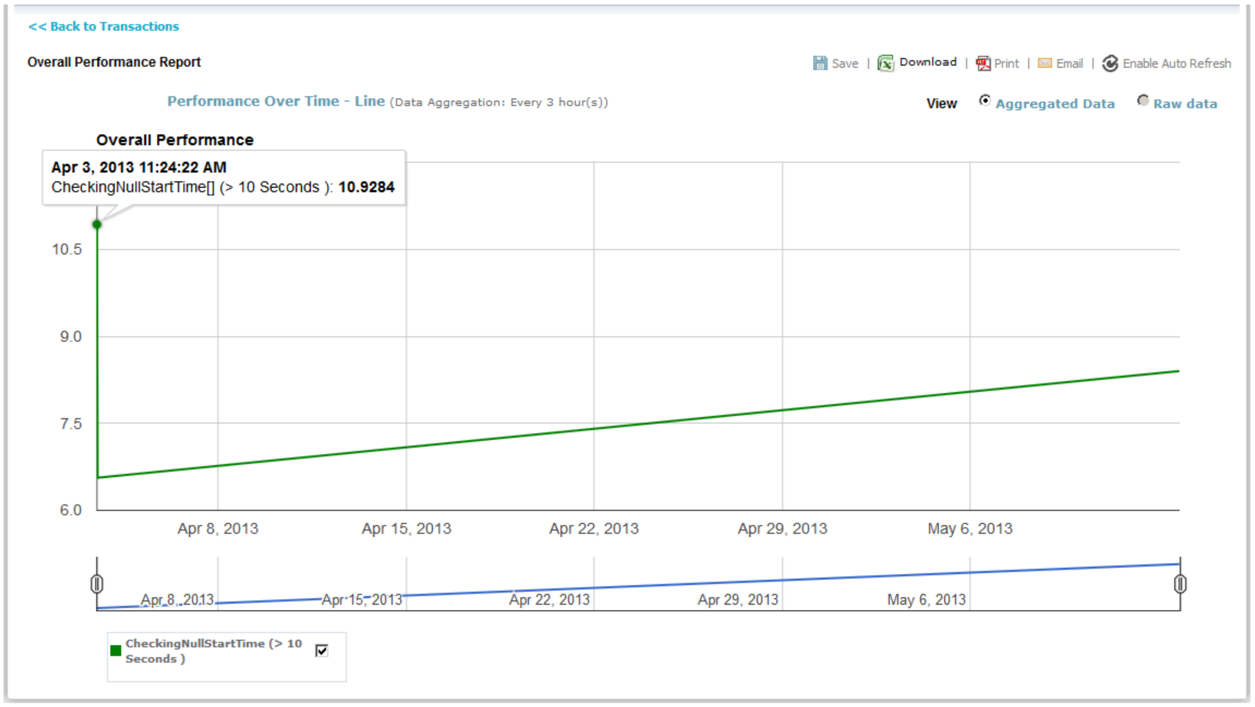


4. Click **Chart** at the top-right corner of the page.
5. From the chart selection dialog box that appears:
   a. Select the **Performance** radio button.
   b. Select a **Chart Type** (**Performance Over Time – Line**).

NOTE Monitor performance charts also display transaction run time information. You can select one or more monitors to view the averaged completion times of all transactions in the monitor(s) in a monitor performance chart.

The image below shows the performance chart for a transaction. Failed runs are defined as those with run times greater than 10 seconds. The chart shows that actual run times are increasing but are still within that threshold, which probably does not need to be adjusted. There is only one performance data point that lies outside the threshold (hover over the graph to see individual data points, as shown below).

Figure 4-3 Transaction Performance Chart

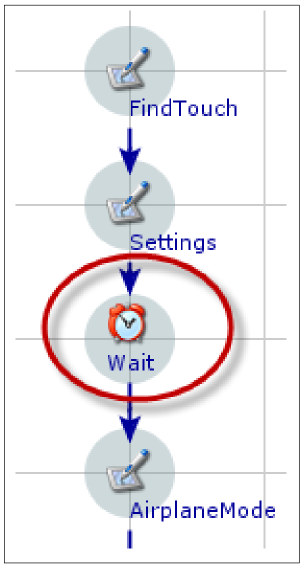


4.2 Step: Rework Scripts

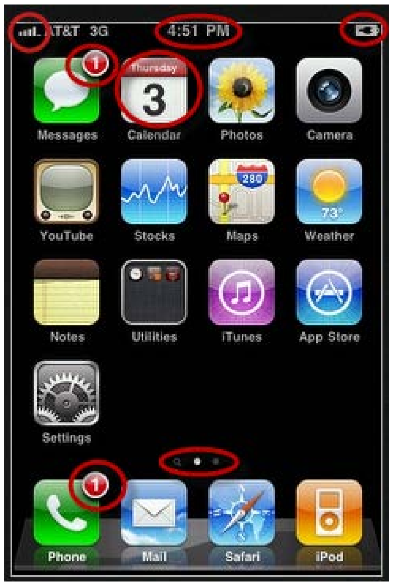
Based on reviewing proofs in detailed results for failed runs, you might need to rework your scripts to eliminate scripting errors that cause failures.

- In order to fix verification failures, you might need to insert wait times between commands to allow a device screen to "catch up" to a script, or eliminate dynamic text or images from reference points.

  The image below shows wait time (Wait command) inserted between sending touchscreen taps to a device (Find and Touch commands).



- The image below highlights areas on an iPhone home screen that are likely to change. These areas, such as dynamic status information on an application icon, should not be included in reference images. (Refer to the *DAE Guide to Text Matching* and *DAE Guide to Image Matching* for information on creating reliable reference points.)



- You will also want to edit your scripts and error types triggered after adjusting error types.

4.3 Step: Adjust Error Types

After examining command-by-command results for failed runs:

- Proofs might reveal an additional failure path that you have not accounted for. You might need to rework scripts to create additional branches (e.g., in Wait Event) to account for this possibility. You might also have to create and insert a new error type to be triggered at this point.

After examining the monitor details report:

- You might discover that certain error types are not being triggered because they have not been inserted in a script—create and insert error types for all points where a script is likely to fail.
- Adjust error definitions to include better reporting on the cause of failure, e.g., you can add a note to indicate exactly where/why an error is triggered.
- You can further refine error categories for more granular reporting, e.g., you can divide the category for general monitor errors into sub-categories for device issues (e.g., application is not installed) and network issues (e.g., unable to connect to Internet).

NOTE In your monitor policy, associate only those general (non-application) error types that you wish to be alerted on; transaction alerts are sent out separately each time a transaction violates expected run time or a Toggle Transaction **Fail** command is encountered.

4.4 Step: Adjust Transaction Settings

Adjust transaction settings, if required, after reviewing results available for failed runs and transaction performance data.

A large number of run results available for successful monitor runs, but ones in which transactions failed, might indicate that expected transaction run times might need to be adjusted. Cross-check transaction performance data to see if actual run times are significantly and consistently above or below expected run times. For example, if your failure threshold is defined as run times over 120 seconds but actual run times are under 50 seconds, you will want to reduce the threshold significantly.

A large number of run results available for successful monitor runs in which transactions failed might also indicate that the operator (e.g., >, <) in the failure threshold is defined incorrectly. In transaction settings, transactions with run times that are <operator> <value> **seconds** are considered failures. For example, if you want an expected run time of 10 seconds or lower, your failure threshold should be > 10 seconds.

4.5 Step: Alerts

Define alerts based on the various categories and levels of errors. You can reuse alerts depending on your organizational structure, e.g., you might want to send alerts for all application errors (major as well as minor) to one team and alerts for general monitor issues (major as well as minor) to another. Or you might want to route all critical alerts to upper management and other alerts to the QA team.

Predefined alerts are associated with monitor and transaction policies and are sent out when polices are violated. Policies can have up to three levels of escalation, each of which can be associated with a different alert. You can send out one alert for incident resolution in each type of policy.

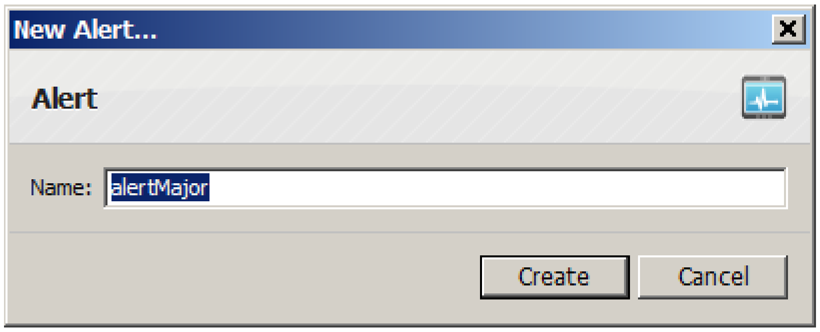
Alert settings include method of delivery (email or SNMP), recipient list, frequency of delivery, and customizable message body.

4.5.1 Creating an Alert

To create an alert in the **Scheduling** tab of the Monitoring view:

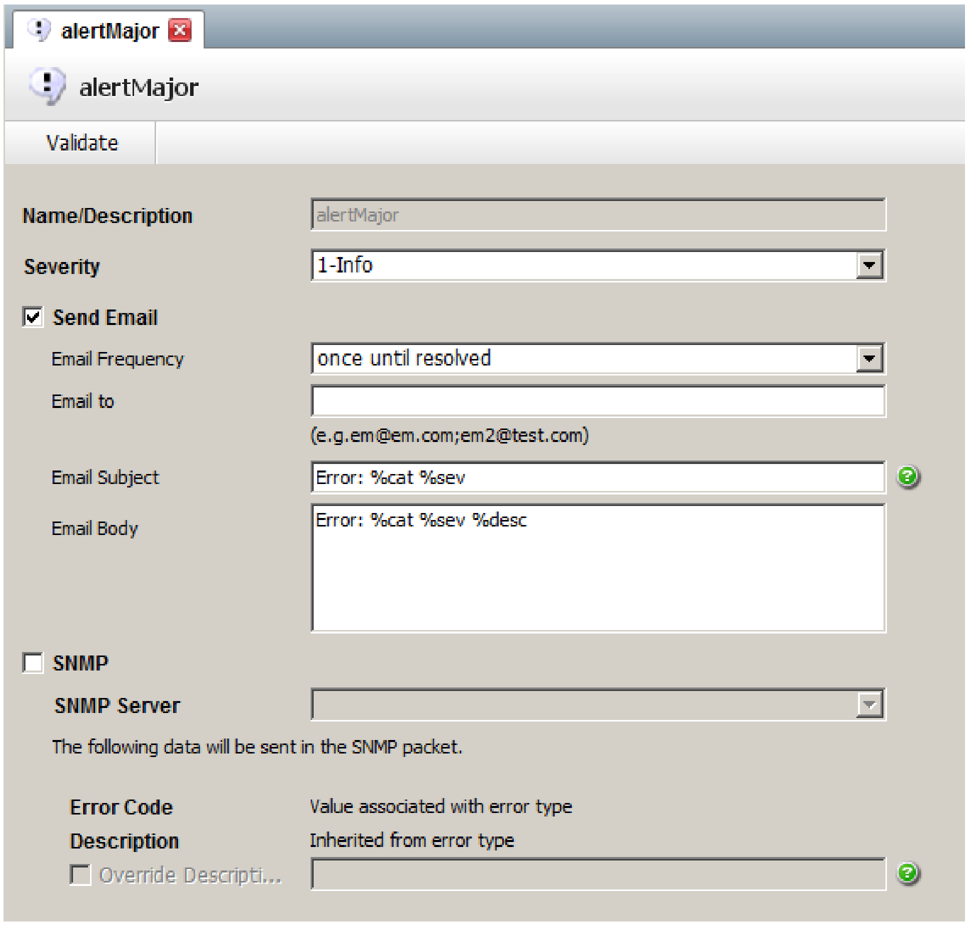
1 Right-click the `alerts` folder of your project and select **New Alerts**.

2 Enter a **Name** for the alert and click **Create**.



Name: alertMajor

The alert template opens up in a tab in the workspace.



alertMajor

alertMajor

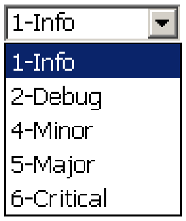
Validate

Name/Description	alertMajor
Severity	1-Info
☑ Send Email	
Email Frequency	once until resolved
Email to	
	(e.g.em@em.com;em2@test.com)
Email Subject	Error: %cat %sev
Email Body	Error: %cat %sev %desc
☐ SNMP	
SNMP Server	

The following data will be sent in the SNMP packet.

Error Code	Value associated with error type
Description	Inherited from error type
☐ Override Descripti...	

3 Select a **Severity** level.



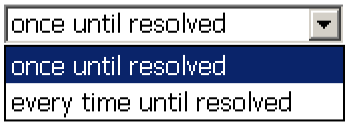
1-Info

1-Info
2-Debug
4-Minor
5-Major
6-Critical

4 Elect an alert type (**Send Email** or **SNMP**):

For an email alert:

a Select a **Frequency**.



once until resolved

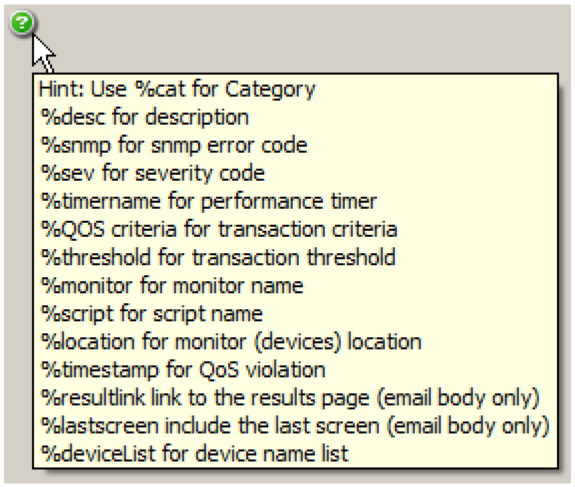
once until resolved
every time until resolved

If you select **once until resolved**, the alert is sent just once for the associated escalation level. If you select **every time until resolved**, the alert is sent for all failed runs associated with a given escalation level. For example, you can use your alert for a level 1 escalation in a monitor policy—the failure thresholds are defined as 3, 5, and 7 failed runs out of 10. If you select **once until**

resolved, the alert is sent out when there are 3 failed runs. If you select **every time until resolved**, the alert is sent when there are 3 failed runs and then again when there are 4 failed runs. (At the 5th failed run, the alert for the next level of escalation is sent out.)

b Enter the recipient list in the **Email to** field—addresses should be separated by semi-colons (no spaces).

c Enter **Email Subject** and **Email Body**—you can type in text or choose from available alert fields. Hover over the green question mark icon to see available alert fields.


Hint: Use %cat for Category
%desc for description
%snmp for snmp error code
%sev for severity code
%timername for performance timer
%QOS criteria for transaction criteria
%threshold for transaction threshold
%monitor for monitor name
%script for script name
%location for monitor (devices) location
%timestamp for QoS violation
%resultlink link to the results page (email body only)
%lastscreen include the last screen (email body only)
%deviceList for device name list

For an SNMP alert:

a Select an **SNMP Server**. Available SNMP servers should have been populated in the DAE Monitoring Portal by your DAE Monitoring system administrator.

b The **Error Code** for the error type triggered is inherited from error definitions and cannot be edited. This are automatically sent out with the alert. You can, however, override the error description. Check **Override Description** and enter your custom definition or choose from available alert fields. Hover over the green question mark icon to see available alert fields.

4.5.2 Guidelines for Alerts

- When creating an alert, use a naming convention that identifies the project, alert type, and severity level. This makes it easy to select the appropriate alert in your monitor or transaction policy.
- Create separate alerts based on your organizational structure and how you would like to report failures. You can define separate alerts for critical vs. non-critical violations or you can define separate alerts for transaction vs. monitor policy violations.
- Alerts are project-wide assets and can be reused, e.g., you can reuse the same alert for all three levels of monitor policy violation.
- Only one alert can be sent out for incident resolution, regardless of the level of escalation at which it is resolved. You can reuse a violation alert or create a separate alert for incident resolution.

4.6 Step: Build Out Monitor Policies

To build out your monitor policy in the second round of the DAE Monitoring workflow:

- Associate/change error types.

  You might decide from reviewing the monitor details report that you want to be alerted on fewer/more error types and change their association to your monitor policy accordingly.

  As mentioned in Adjust Error Types above, associate only those general (non-application) error types that you wish to be alerted on; transaction alerts are sent out separately each time a transaction violates expected run time or a Toggle Transaction **Fail** command is encountered.

- Define the number of failures out of a fixed number of runs that constitute different levels of violation. You might decide to define more/fewer levels of violation depending on how often you wish to be alerted and the frequency of script failure. If your script fails more often, use a smaller denominator when setting your monitor policy, e.g., set a level 2 escalation as 3 out of 5 failed runs rather than 3 out of 7 failed runs.

- Associate alerts for violation levels defined and optionally, for incident resolution. You can reuse alerts for different levels of violation as well as for incident resolution.

NOTE Creating a monitor policy is covered in Scripting Workflow: Round One.

4.7 Step: Transaction Policies

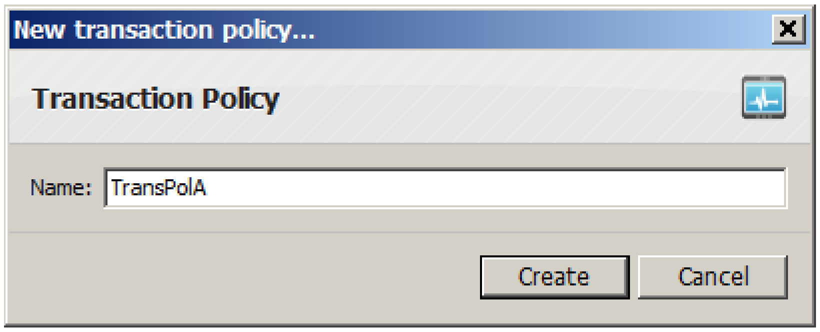
Based on transaction run times (performance) and success rate (availability) observed in the DAE Monitoring Portal, you can define transaction policies. These policies set tolerance levels for transaction failure, defined as violations of expected run times as well as for the failure of transactions to be completed as expected.

4.7.1 Creating Transaction Policies

To create a transaction policy in the **Scheduling** tab:

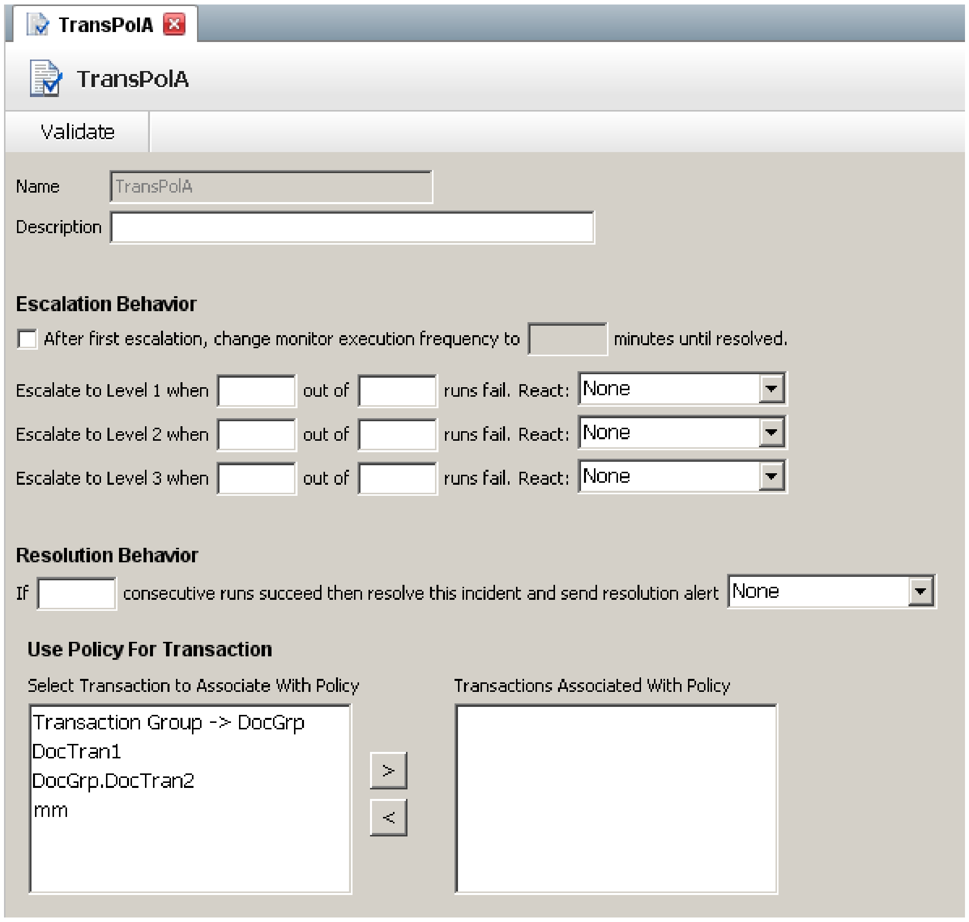
1 Right-click the `transaction policies` folder of your project and select **New transaction policy**.

2 Enter a **Name** for the transaction policy and click **Create**.



Name: TransPolA

The transaction policy template opens up in a tab in the workspace.



TransPolA

Validate

Name: TransPolA

Description:

Escalation Behavior

☐ After first escalation, change monitor execution frequency to ___ minutes until resolved.

Escalate to Level 1 when ___ out of ___ runs fail. React: None

Escalate to Level 2 when ___ out of ___ runs fail. React: None

Escalate to Level 3 when ___ out of ___ runs fail. React: None

Resolution Behavior

If ___ consecutive runs succeed then resolve this incident and send resolution alert None

Use Policy For Transaction

Select Transaction to Associate With Policy:
Transaction Group -> DocGrp
DocTran1
DocGrp.DocTran2
mm

Transactions Associated With Policy:

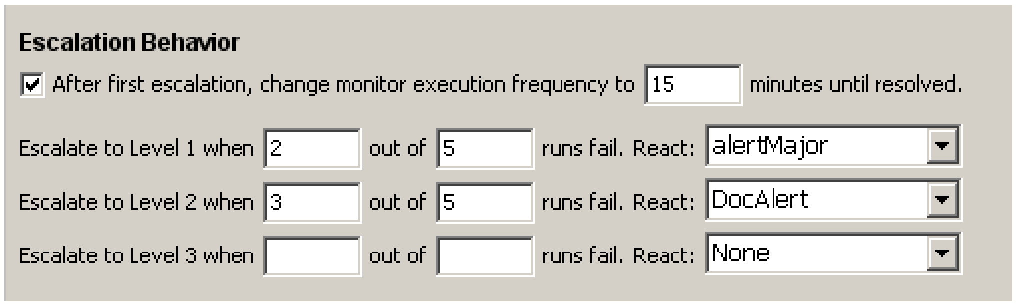
3 Enter a **Description** for the policy. As a best practice, use this space to summarize tolerance thresholds for transaction failures, e.g., 2-3 out 5 runs.

4 Specify **Escalation Behavior** for up to three levels of policy violation. In the image below, two levels of transaction policy violation are defined.

a You must choose the number of failed runs out of a given number of runs that constitute a violation.

b Select an alert from the **React** drop-down list for each level of violation you use.

c Optionally, change the frequency of monitor execution if the transaction policy is violated.



Escalation Behavior

☑ After first escalation, change monitor execution frequency to 15 minutes until resolved.

Escalate to Level 1 when 2 out of 5 runs fail. React: alertMajor

Escalate to Level 2 when 3 out of 5 runs fail. React: DocAlert

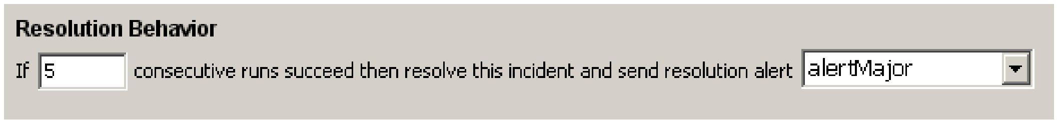
Escalate to Level 3 when ___ out of ___ runs fail. React: None

5 Specify **Resolution Behavior.**

a You must enter the number of consecutive successes required to resolve an incident. The number of runs must be equal to or greater than the sample size used when establishing performance levels. In this instance, resolution requires 5 or more consecutive successes.

If you do not specify a resolution, the number of runs required to resolve a Level 1 escalation automatically resolves the incident (in the example above, 3 consecutive successful runs).

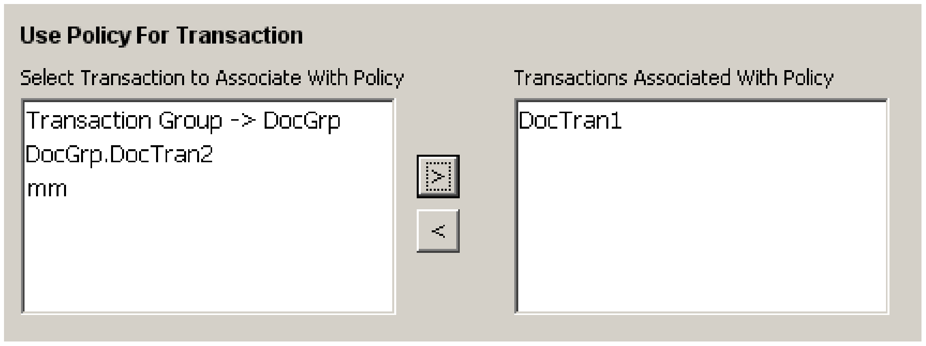
b Select an alert from the drop-down list to send out an alert for incident resolution.



Resolution Behavior

If 5 consecutive runs succeed then resolve this incident and send resolution alert alertMajor

6 Associate a transaction or transaction group to the policy. Select a transaction in the left pane and use the directional arrow to move it to the right pane.



Use Policy For Transaction

Select Transaction to Associate With Policy
- Transaction Group -> DocGrp
- DocGrp.DocTran2
- mm

Transactions Associated With Policy
- DocTran1

NOTE If you select multiple transactions or a transaction group, failure of any associated transaction contributes to an incident (see Transaction Policy Guidelines below).

7 **Check In** your transaction policy. Automatic validation ensures that fields are filled out correctly.

4.7.2 Transaction Policy Guidelines

- When creating a transaction policy, use a naming convention that includes the project and identifies it as a transaction policy, e.g., WebAppTransPolicy1.
- In the transaction policy description, summarize the tolerance thresholds for transaction failures, e.g., 2-3-4 of 5 runs.
- Associate only one transaction with a transaction policy. The only time you want to associate several transactions to a single policy is when the transactions measure similar aspects of a service that you want to track together.

  When multiple transactions are associated with one policy, all the transactions are evaluated together. So a violation of the acceptable completion time in any one of the transactions contributes to the same incident.
- If a level 1 violation is defined as 3 failed runs out of 6, and 3 out of the first 4 runs have failed, the system triggers an alert immediately; it does not wait to complete 6 runs before sending out the alert.
- The number of runs in resolution criteria must be equal to or greater than the sample size used when establishing performance levels. For example, if a level 1 violation is defined as 2 out of 6 failed runs, then you must set the resolution criteria to 6 or more consecutive successful runs.

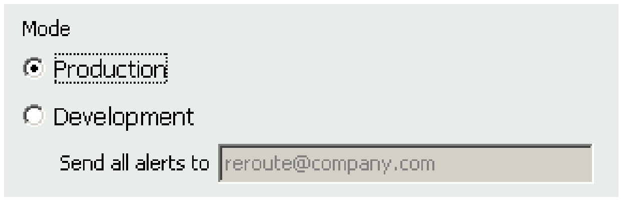
If you do not specify a resolution, the number of runs required to resolve a Level 1 escalation automatically resolves the incident (in the example above, 3 consecutive successful runs).

4.8 Step: Deploy Monitor in Production Mode

Before redeploying your monitor:

1 Double-click to open your monitor and check it out.

2 Select the **Production Mode** radio button (alerts will *not* be rerouted to a test address when the monitor is enabled).



Mode
● Production
○ Development
Send all alerts to reroute@company.com

3 Check your monitor in (but do not close the tab).

4 Ensure that your monitor scripts (actions and test case) are checked in.

5 Re-publish your project (right-click the project in the project list > **Publish Project**).

6 Click **Enable Monitor** at the top of the open monitor tab. This deploys the monitor. Your monitor does not need to be checked out to be enabled.

You can make changes to your project at any time while monitors from the project are deployed. However, you must re-publish the project for changes to take effect. Republishing a project with live monitors has the effect of resolving any open incidents.

4.9 Step: Track Results

Use the DAE Monitoring Portal dashboard to track currently running monitors and live device screens as scripts are executed on them. You can also view historical monitor data such as a list of all monitor executions, success rates for individual monitors, error reports, trend charts, and detailed results for individual script runs. All standard reports can be customized for display using filters and date ranges. Users with permissions can exclude specific runs from some reports. Additionally, users can save customized report criteria and generate reports from them at any time. Monitor reporting data aids immediate incident tracking and management as well as mid- to long-term trend analysis for the purposes of product improvement and performance benchmarking.

Refer to the *DAE Monitoring Portal Guide* for a detailed explanation of viewing and interpreting results.