



Writing Use Case Scenarios for Model Driven Development

This guide outlines how to use Enterprise Architect to rapidly build Use Cases and increase your productivity through Model Driven Development. Use Case Scenarios can help drive downstream development via automatically generated test cases, activity diagrams, sequence diagrams and much more. In this guide, we use an example Automatic Teller Machine (ATM) system to explain Enterprise Architect's Structured Scenario editing capability.



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Introduction

The purpose of this document is to demonstrate how to use Enterprise Architect's Structured Scenario Editor. You will learn how to produce Use Cases and Structured Scenarios that are capable of automatically generating UML Behavior Diagrams and Test Cases. This guide uses the example of a customer interacting with an Automatic Teller Machine (ATM) to display their bank account balance. Each Scenario Step is linked to relevant actions, glossary items, results and state information. The example scenario is then used to generate Test Cases and a corresponding Test Diagram that traces the Use Case, its Scenarios and the generated Test Scripts.

What You Will Learn

This Quick Start Guide teaches you how to:

- Rapidly build Scenarios using Enterprise Architect's Structured Scenario editor.
- Import existing text based Scenarios to improve productivity.
- Automatically produce Activity Diagrams and Test Cases from a Scenario.
- Develop Test Cases that result in accurate systems that better reflect user needs.
- Create and manage a dynamic glossary to maximize traceability across the entire model.
- Automatically derive Acceptance Tests from Structured Scenarios for members of the Quality Assurance team.

What You Will Gain

Applying the information in this Quick Start Guide will allow you to:

- Create Use Case models that elicit detailed functional requirements.
- Help build more accurate, traceable and robust systems.
- Better understand system and user interactions through structured analysis.

Assumptions

This Quick Start Guide has been written under the following assumptions:

- That you are currently using Enterprise Architect 8, build 860 or above.
- That you are already familiar with UML's Use Case notation.

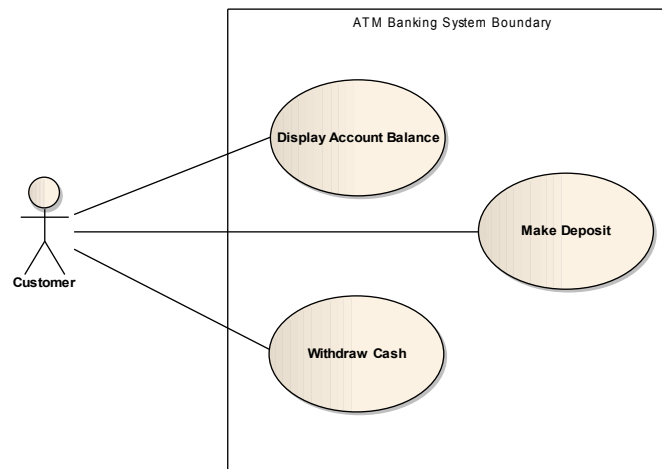


Glossary

Use Case: A UML element for capturing the requirements of a system. Each Use Case Element represents a user's goal when interacting with the system.

Actor: A UML element representing the role of a person, object or device that interacts with a system.

Use Case Diagram: A UML behavior diagram that visually describes the functional requirements of a proposed system and shows the relationships between Actors and Use Cases.



Scenario: A brief user story explaining who is using the system and what they are trying to accomplish.

Step: A Scenario is made up of a number of simple, discrete steps that are designated as being performed by either the “System” or a “User”. In Enterprise Architect, each step may reference Results, Uses and State information to provide greater context and improved traceability.

Basic Path: Describes the sequence of events when everything goes as expected. Also known as the “Happy Path”, “Basic Course”, “Sunny Day Scenario”, “Primary Path” or “Expected Path”.

Alternate Path: Each tested rule may produce an Alternative Path, with an alternative set of steps that run in parallel with part of the Basic Path.

Exception Path: The result of a step in the Basic Path that fails to produce a successful result.

Test Case: A specific executable test that examines inputs and outputs to determine whether a system is working correctly. Test Cases can be automatically derived from a Structured Scenario.

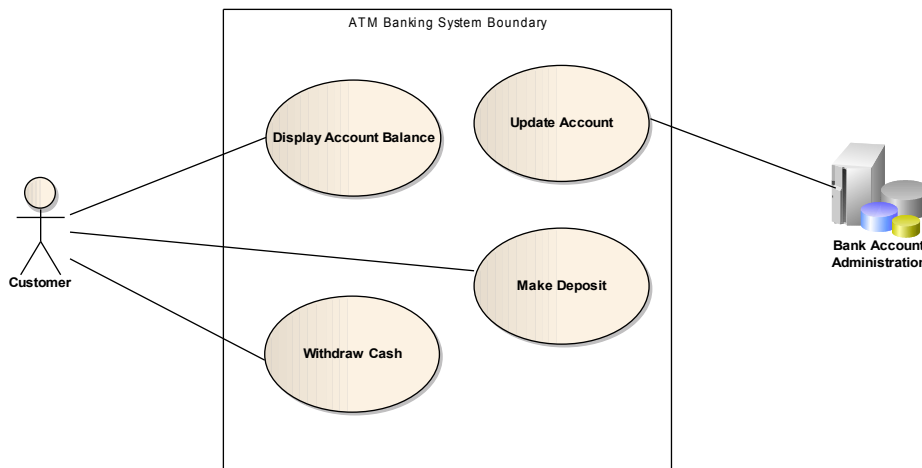
Activity Diagram: A UML diagram used to display the sequence of activities. Ideal for detailing situations where parallel processing (eg. Alternative Paths) may occur. Each Activity is represented by a rounded rectangle, while Decision and Merge nodes are represented by a diamond shape.

Creating a Use Case Diagram

1. Open Enterprise Architect and create a new file entitled “atm_example.eap”. Create a new Use Case Diagram called “ATM Account Balance”.



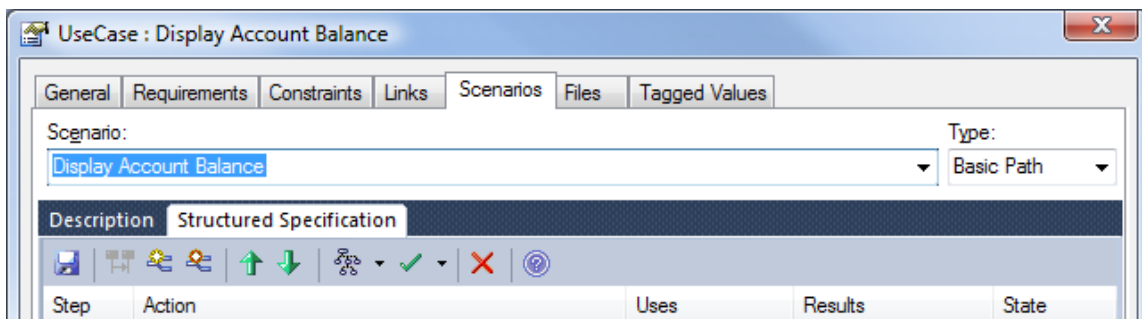
2. Use the Toolbox to create an Actor called “Customer” and place it on the left side of the Diagram. Create a Use Case called “Display Account Balance” and place it in the middle of the Diagram.
3. Select the Customer element and use the Quick Linker to create a 'Use' Relationship between the Customer and Display Account Balance.
4. The completed Use Case Diagram is shown below with additional Use Cases and an Actor that represents the Bank's Account Administration subsystem.



Note the custom image used for “Bank Account Administration” as an alternative to the standard UML Actor notation. Enterprise Architect's “Alternate Images” can help you produce professional documents for clients or managers who are not necessarily well versed in UML. More information on [using Alternate Images](#) is available in Enterprise Architect's User Guide.

Using the Structured Scenario Editor

1. Right-click the Display Account Balance Use Case to access the Properties Dialog Box.
2. Click on the Tab entitled Scenarios.
3. Label the Basic Path “Display Account Balance”, as shown below.





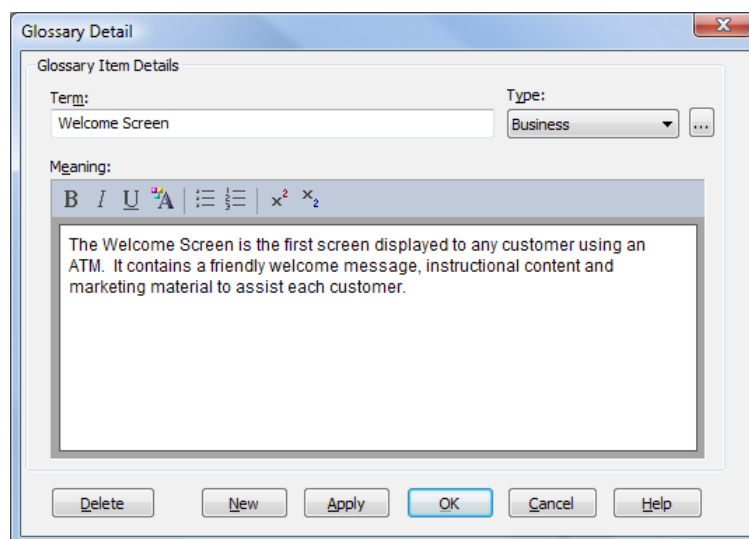
4. The Scenarios Tab contains two additional Tabs entitled Description and Structured Specification.
5. The Description Tab is used to enter a plain text description of the Use Case. Note: Enterprise Architect can convert a plain text description into a Structured Scenario. Simply right-click the text based description and select Create Structure From Notes | New Line Delimited.
6. The Structured Specification Tab controls each aspect of your Structured Scenario. Green arrows allow you to easily move each step to modify the sequence of events, while other tools allow you to save your scenario, manage paths, generate diagrams and automatically produce test cases.

Creating a Scenario

1. Each Scenario step is labeled with either an Actor icon (for a user step), or a computer icon (for a system step). Enterprise Architect will automatically assign the appropriate icon by scanning the first 15 characters of text to determine if the action represents a user or a system step. You can manually override the assigned label by double-clicking the icon.

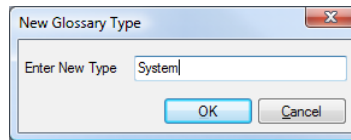


2. To create the first step, enter the text “System displays Welcome Screen” in the region labeled "new step...". This region describes the action taken by the user or system.
3. Set the State equal to “Pending” to denote that the system is awaiting a bank card. Ensure that the computer icon is visible.
4. Organizations often use a Glossary to help ensure consistency of terms across projects. You can dynamically access your Enterprise Architect Glossary definitions as you type by selecting "Ctrl + Space". This intelligent auto-complete allows you to rapidly select terms from a drop-down list.
5. Highlight the phrase Welcome Screen, right-click and select Create | Glossary Definition. Define the meaning of a 'Welcome Screen' as illustrated below.

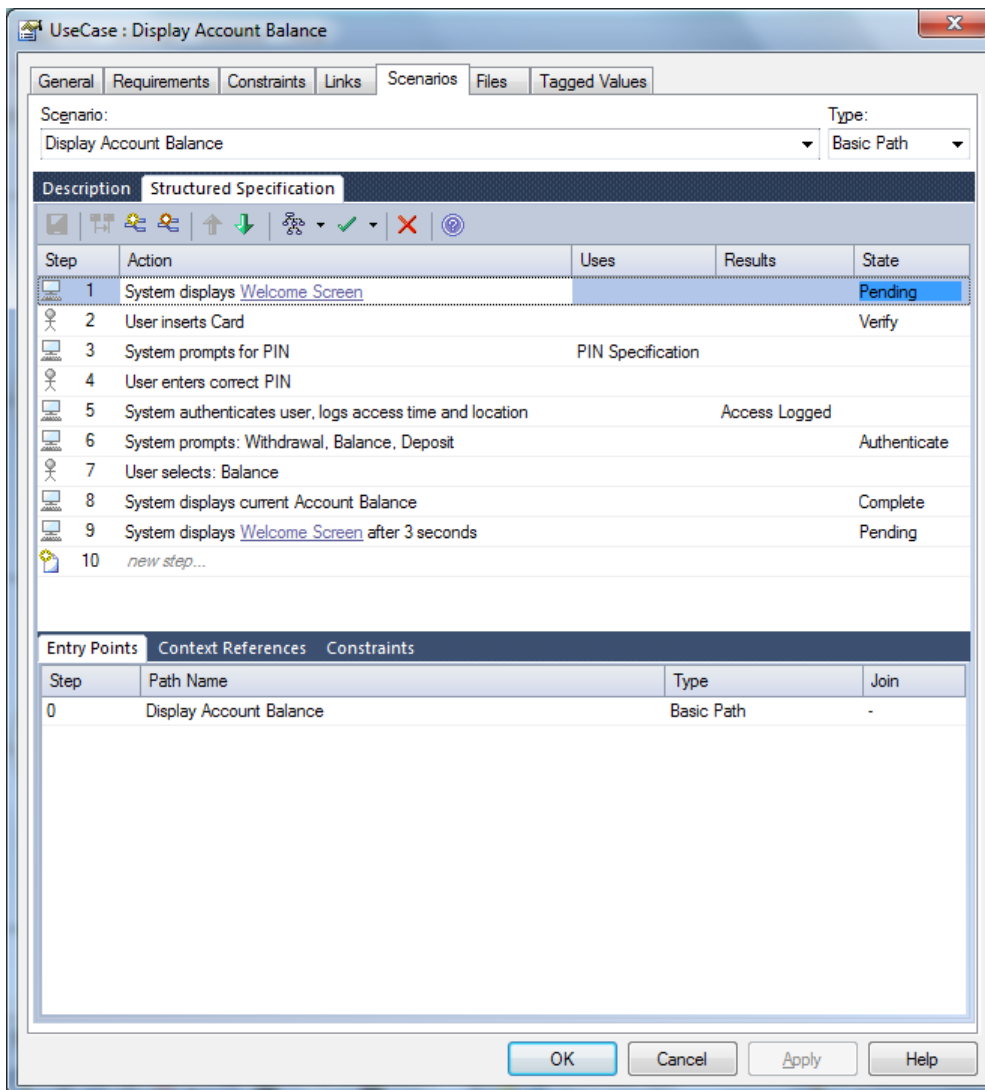




- To create a new Glossary Type, click on the ellipsis (3 consecutive dots) located next to the Type drop-down list. Create a new System Glossary Type called "System" and then press OK.



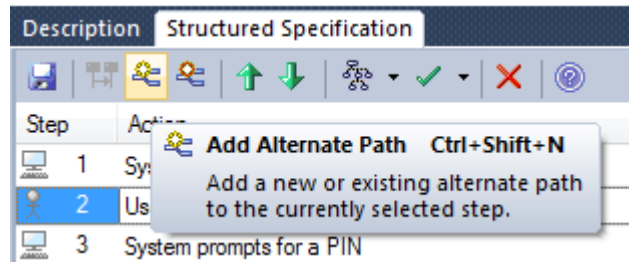
- The Basic Path displayed below indicates that an element, such as "PIN Specification", could be linked to a scenario step via the "Uses" column. This helps to provide greater context and comprehensive traceability. PIN Specification may be defined as an element in our business rules or domain model for example.



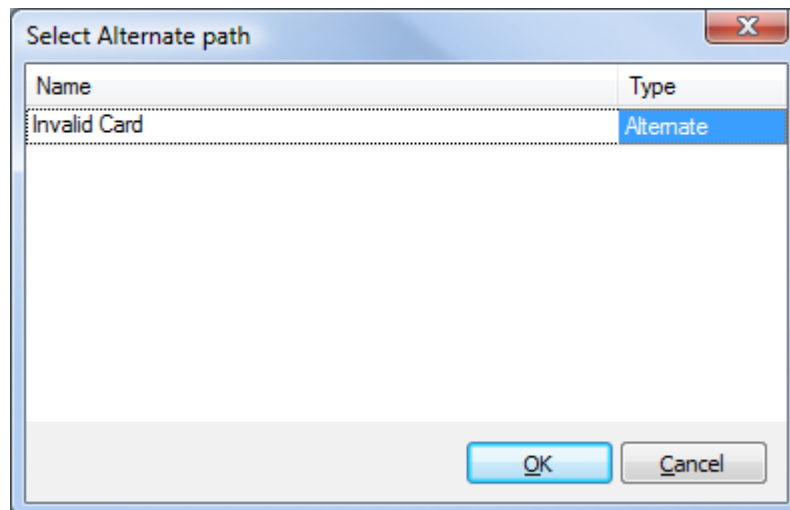


Alternative Path Creation

1. We shall now create an Alternate Path when a User inserts an invalid card by mistake.
2. Select Step 2 and create an Alternate Path. This can be completed by selecting the “Add Alternate Path” icon on the Toolbar shown below (Ctrl+Shift+N).



3. You will be prompted to Select Alternate Path. Double-click the Name Field to label the Alternate Path “Invalid Card” and press the OK button.

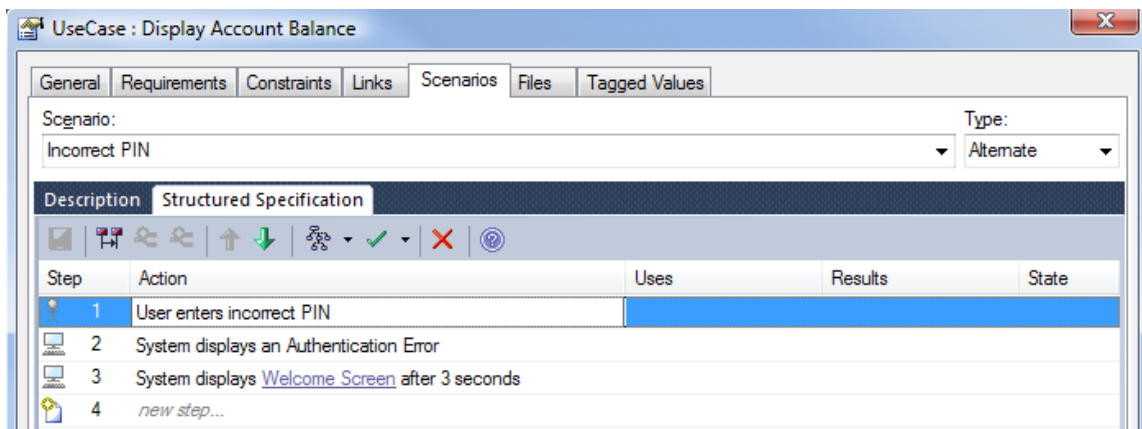
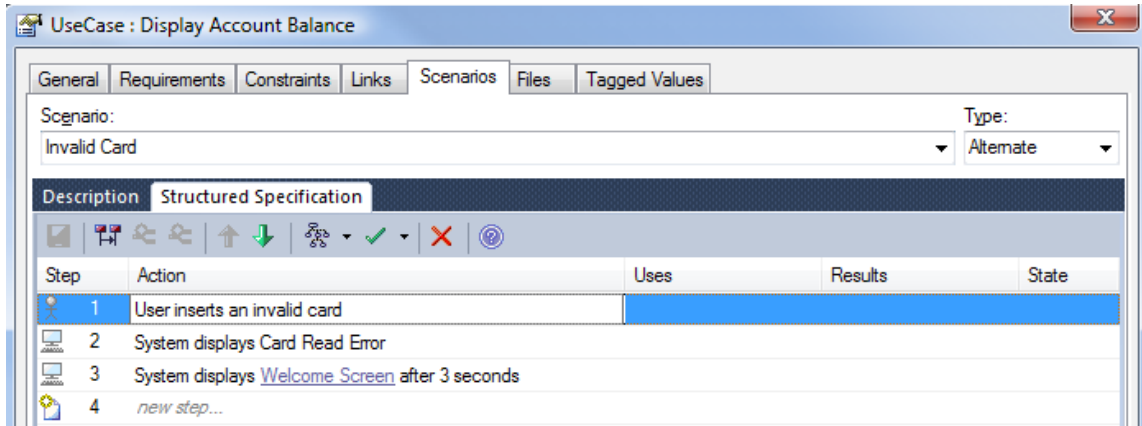


4. The Alternate Path is now displayed at the bottom of the Structured Scenario Editor. The Invalid Card Path currently indicates that it will Join the Basic Path at the End. To change this value, double-click the word End and select step number 1 from the drop down list. When a Customer inserts an Invalid Card, after the Alternate Path is complete the user must return to Step 1.

Step	Path Name	Type	Join
0	Display Account Balance	Basic Path	-
2a	Invalid Card	Alternate	1



5. To edit the Alternate Path, double-click the Path Name entitled “Invalid Card”.
6. Note: To return to the Basic path, press Ctrl+B or select the Second Icon (Purple)
7. The following diagrams represents the completed Structured Scenario containing all three Paths.





Completed Structured Scenario

The following screen shows the completed Structured Scenario.

The screenshot shows the 'UseCase : Display Account Balance' window in Enterprise Architect. The 'Scenarios' tab is active, showing a structured specification for the scenario. The scenario is named 'Display Account Balance' and is of type 'Basic Path'. The structured specification table lists 10 steps, including actions like 'System displays Welcome Screen', 'User inserts Card', 'System prompts for PIN', 'User enters correct PIN', 'System authenticates user, logs access time and location', 'System prompts: Withdrawal, Balance, Deposit', 'User selects: Balance', 'System displays current Account Balance', and 'System displays Welcome Screen after 3 seconds'. The 'Entry Points' table shows three entry points: '0 Display Account Balance' (Basic Path), '2a Invalid Card' (Alternate), and '4a Incorrect PIN' (Alternate).

Step	Action	Uses	Results	State
1	System displays Welcome Screen			Pending
2	User inserts Card			Verify
3	System prompts for PIN	PIN Specification		
4	User enters correct PIN			
5	System authenticates user, logs access time and location		Access Logged	
6	System prompts: Withdrawal, Balance, Deposit			Authenticate
7	User selects: Balance			
8	System displays current Account Balance			Complete
9	System displays Welcome Screen after 3 seconds			Pending
10	<i>new step...</i>			

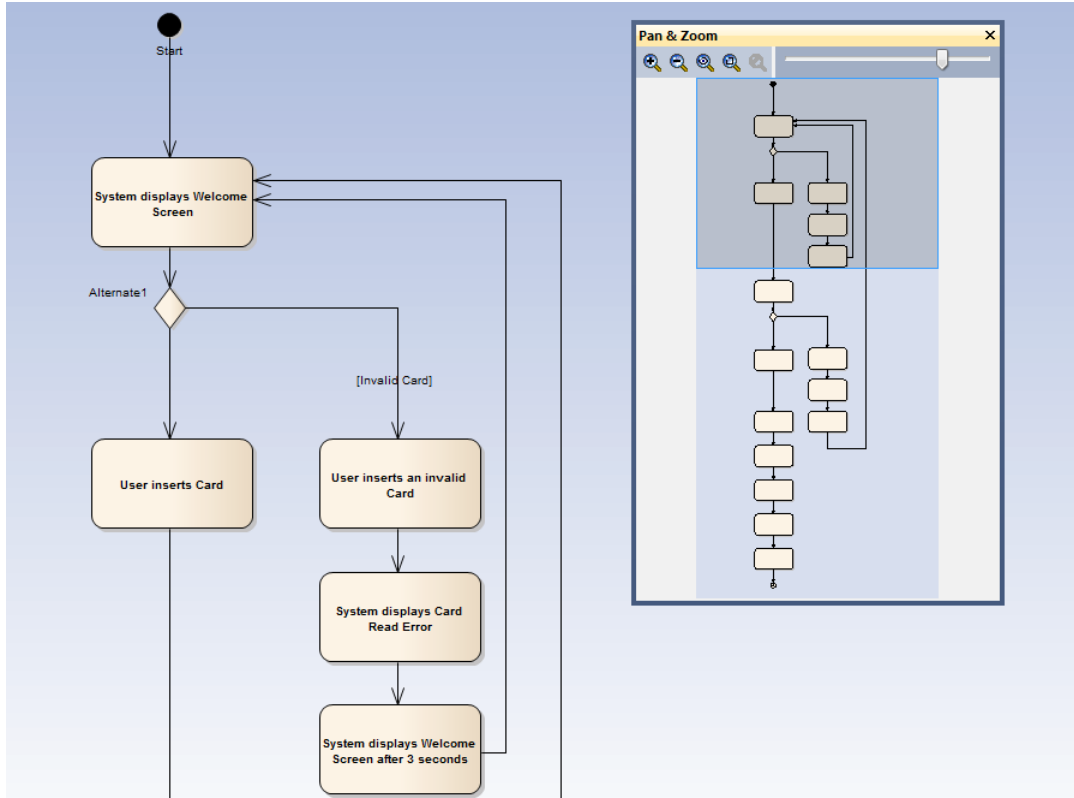
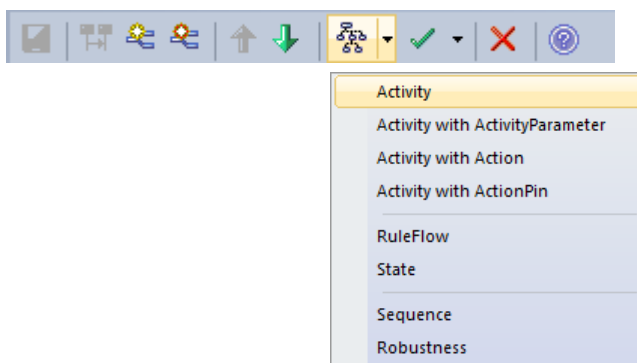
Step	Path Name	Type	Join
0	Display Account Balance	Basic Path	-
2a	Invalid Card	Alternate	1
4a	Incorrect PIN	Alternate	1



Creating an Activity Diagram

A UML Activity diagram graphically represents a process (or Scenario). It can help visualize the individual actions (or steps), the sets of decisions and control flow of the process. Each decision is represented by a diamond and each action is represented by a rounded rectangle. The Basic Path is represented by those elements on the left hand side of the diagram.

1. Select the Generate Diagram icon highlighted below, then select the Activity menu option. Enterprise Architect will automatically generate an Activity Diagram from the Structured Scenario. You can use the Pan & Zoom window shown below to view the whole diagram.

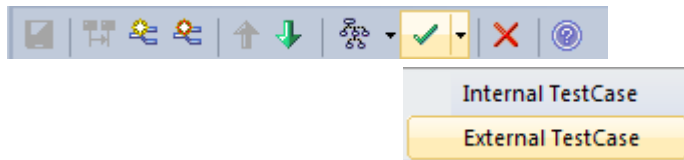




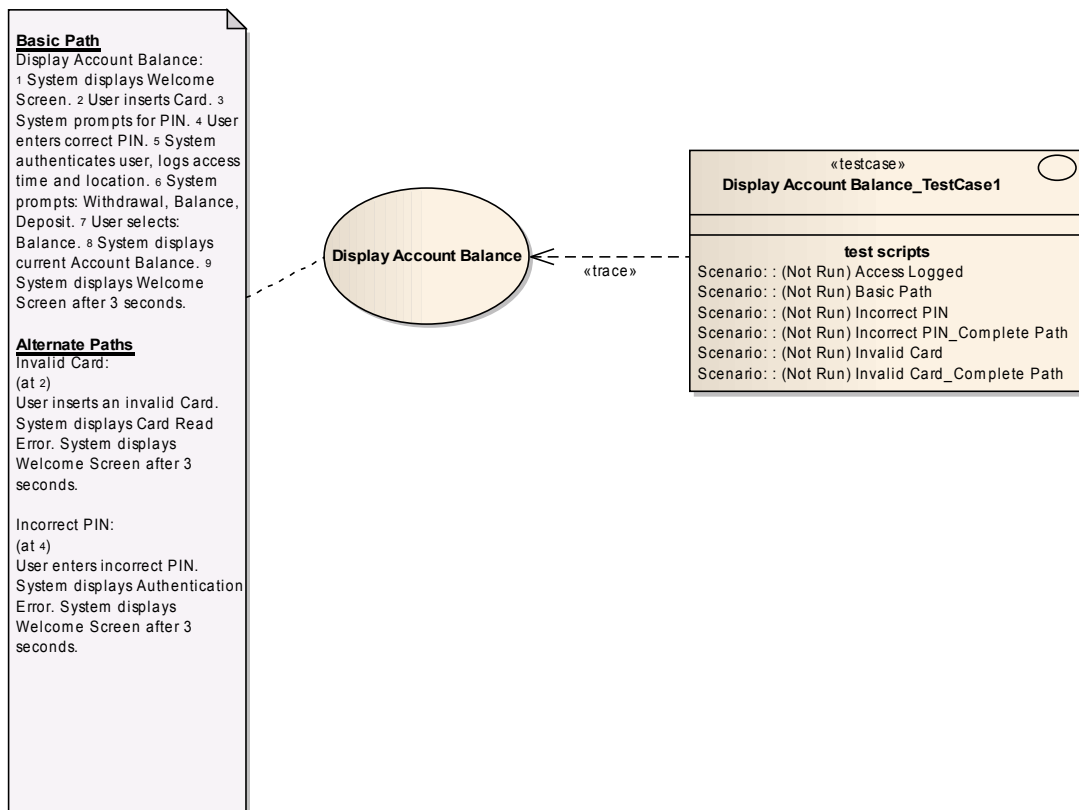
Creating a Test Case

Enterprise Architect can automatically generate a Test Case based on a Structured Scenario. Each Test Script corresponds to a given path and is displayed in the Test Scripts Compartment.

1. Select the Green Arrow and select External Test case.



2. Enterprise Architect will automatically produce a Maintenance Diagram that outlines the various paths.



3. Select View | Testing to review the automatically generated Test Cases. Select the Scenario Tab and select the Test Case to view the relevant details.
4. The following diagram outlines a number of Test Cases.



A Completed Test Case for Displaying an Account Balance

The screenshot shows the 'Testing' window in Enterprise Architect. On the left, a table lists several test cases, all with a status of 'Not Run'. The 'Basic Path' test case is selected. The main area displays the details for this test case:

Test	Status
Invalid Card	Not Run
Invalid Card_Complete Path	Not Run
Incorrect PIN	Not Run
Incorrect PIN_Complete Path	Not Run
Access Logged	Not Run
Basic Path	Not Run

Test: Basic Path
Status: Pass
Type: Standard
Run By: [Empty] Checked By: [Empty] Last Run: 6/07/2010

Description

Start

1. System displays Welcome Screen
2. User inserts card
3. System prompts for a PIN
Uses: PIN Specification
4. User enters correct PIN
5. System authenticates user, logs access time and location
6. System prompts: Withdrawal, Balance or Deposit
7. User selects: Balance
8. System displays current Account Balance
9. System displays Welcome Screen after 3 seconds

Result
Basic Path complete.
Use case ends.

Unit Integration System Acceptance * Scenario

Summary



What have we learned?

Use Cases capture and communicate functional requirements using a format that is easy to understand by clients and developers alike. Enterprise Architect leverages Use Case Scenarios to generate test cases, Activity Diagrams and drive downstream development. In this guide, we have demonstrated how to create a Use Case Diagram and a Structured Scenario using the example of a customer displaying their bank account balance via an ATM. We have highlighted just some of the functions available to generate downstream artifacts using Enterprise Architect's Structured Scenario Editor.