Business Activity Monitoring

Knowing what your process is doing

pluralsight
see what you can learn

Agenda

- **What is BAM**
- **Defining BAM data**
- **Programming BAM data collection**
- **Viewing BAM data**

What is BAM and why should developers care

- **BAM is about providing *visibility* into a business process**
- **Managers want information about the process**
- **Answer questions like:**
  - How many orders have been processed today, this month?
  - How long does it take to process an order?
  - Where are the bottlenecks in our process?
- **Operations might use BAM to collect information**
  - Support *Service Level Agreements*
  - Monitor operations data instead of business data
- **Developers have to make it happen**
  - Program data extraction and collection

pluralsight
see what you can learn

Typical BAM development cycle

- **Business Analyst**
  - Define data to be collected (activities) using Visio/Excel
  - Define views of data that will be available
- **Developer**
  - Implement the data collection using BAM definition
  - Deploy tracking profile and code artifacts
- **IT Pro**
  - Use definition from analyst to deploy the BAM infrastructure
- **Business user**
  - Use BAM Portal (new in 2006) to view the data
  - Sign up for notifications based on aggregates or triggers

BAM Concepts

- **Activity – defines a set of related data points in a process**
    - e.g. all data related to a purchase order process
    - Provides the core information used to build infrastructure

BAM Concepts

- **View – defines a view over the data in an activity**
  - Provides the ability to filter information for different audiences
  - Views can be secured to allow access to the appropriate users
  - Definition in Excel includes building a pivot table based on data
  - Primary interface for querying and viewing data (more later)
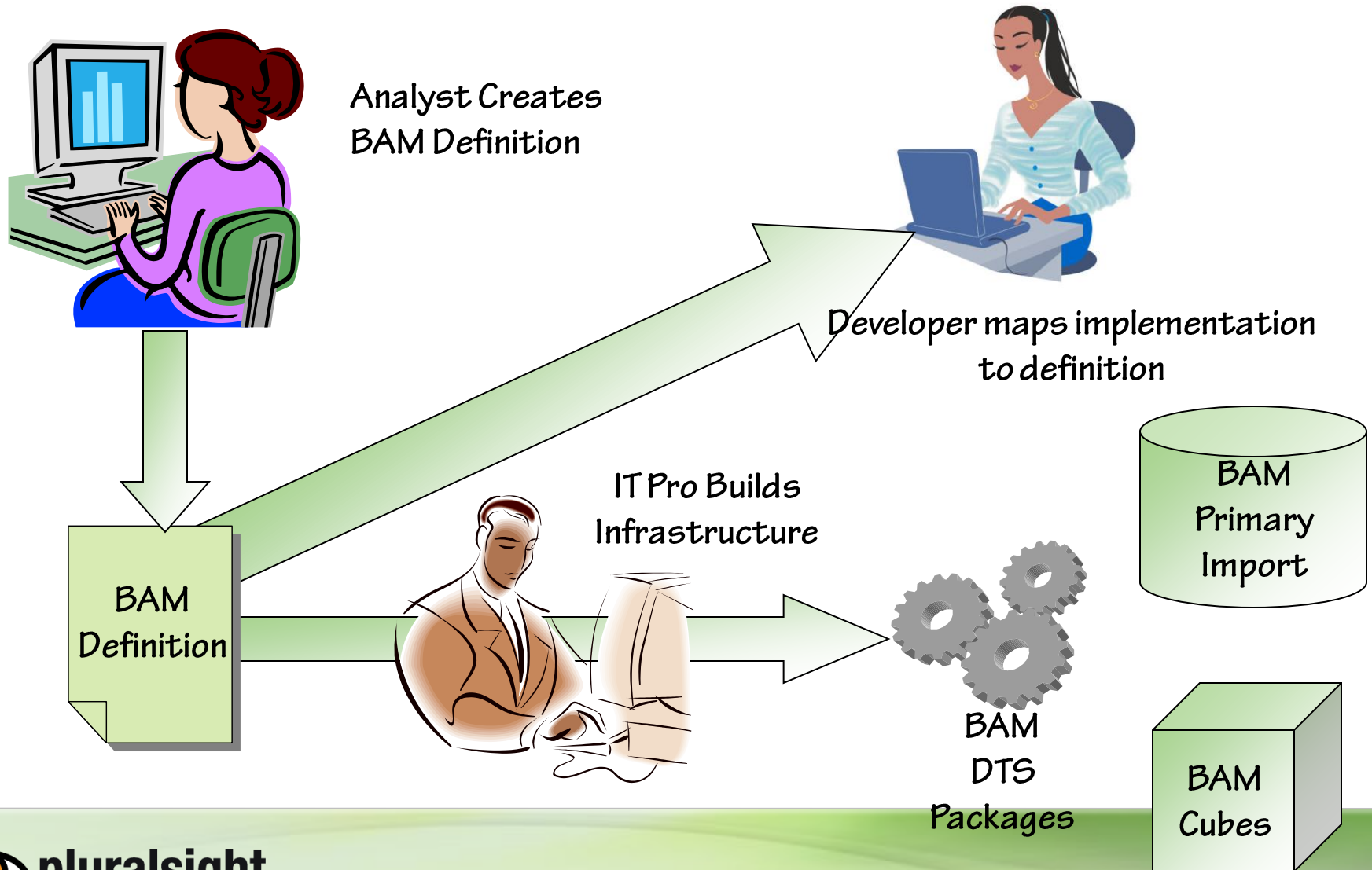
BAM Concepts

- **Relationship – used to connect different activities together**
    - Connect the purchase order process to the shipping process
    - Consumers of the data can navigate the relationship
    - Single view over multiple activities provides link in BAM Portal
    - Developer will need to configure/code relationship

Defining BAM data

- The BAM definition is the key component needed to get started
- Contains the definition of activities and views in XML format
- Used to build the necessary database infrastructure
- Used by the developer to program/configure data collection

BAM Development Cycle

Analyst Creates
BAM Definition

Developer maps implementation
to definition

IT Pro Builds
Infrastructure

BAM
Definition

BAM
Primary
Import

BAM
DTS
Packages

BAM
Cubes

Defining BAM data

- **BAM definition includes the following**
  - Simple data points to be collected (e.g. message values)
  - Milestones of particular events (e.g. process started)
  - Durations or the time between events
  - Definitions of aggregate values to be computed
  - Dimensions to be used to "slice" the data
- **Also indicates if collection is real time, or historical**
  - Real time = rolling SQL Server views
  - Historical = SQL Analysis Services cubes

pluralsight
see what you can learn

Programming BAM Data Collection

- **Define tracking profile to indicate automated data collection**
  - Tracking profile editor used to map from artifacts to definition
- **Write BAM data directly from code**
  - Pipeline components
  - Web Services or .NET applications
  - Custom .NET assemblies called from BizTalk
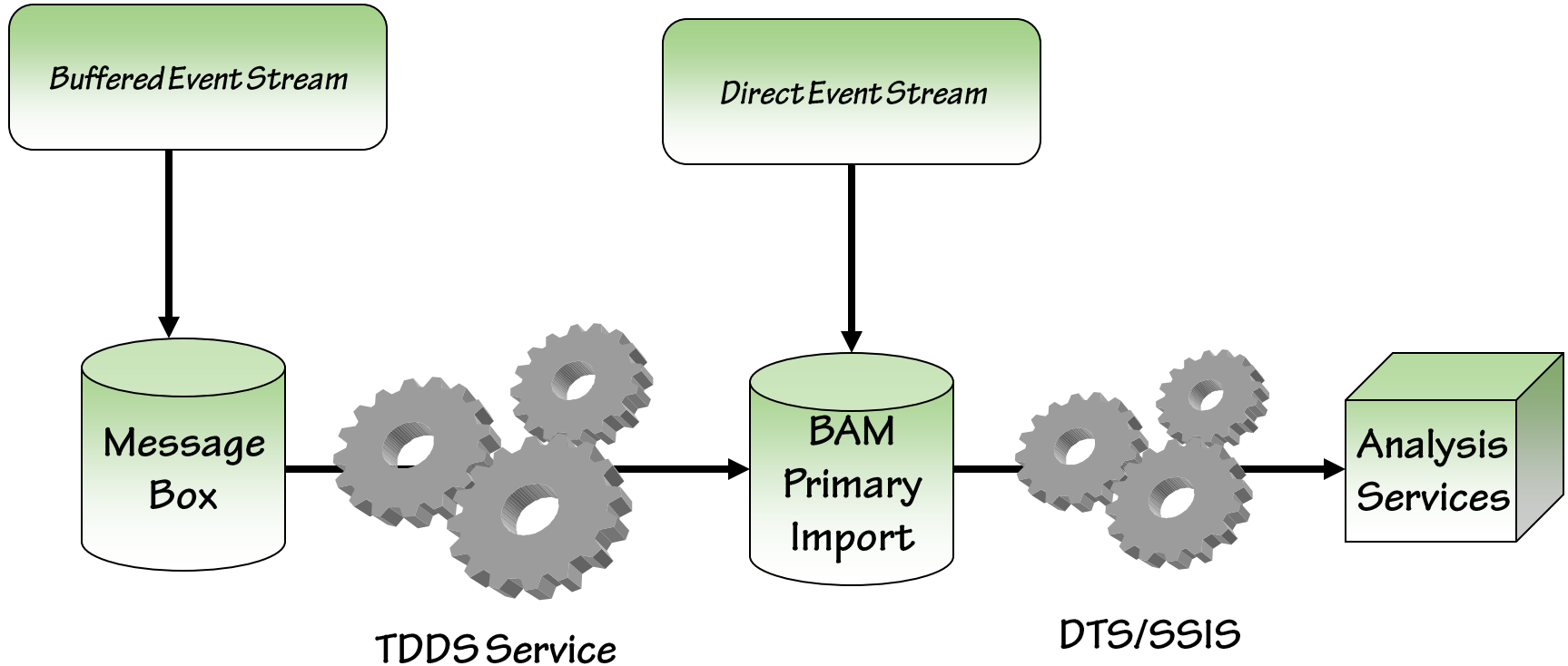
Tracking Profile Editor

- **Tool used by developers to map data extraction from artifacts**
  - Orchestration shapes as milestones
  - Message values as data (based on schema)
  - Message context properties
- **Publish the profile and BizTalk takes care of data collection**
- **BTS 2004 - tracking profile per assembly**
  - Experienced is focused on the assembly and not the activity
- **BTS 2006 – tracking profile per BAM activity**
  - Experience focuses on the activity and collecting data from various sources

Writing BAM Data – The Event Stream

- **DirectEventStream – writes data directly to BAM database**
  - Data is written when call completes, but throughput is slower
- **BufferedEventStream**
  - Writes data to the MessageBox with the message
  - EventBusService moves data to BAM import database later
  - Better performance for writing data from code
- **OrchestrationEventStream**
  - Provides static methods to write BAM data that is transactionally consistent with the orchestration state
- **BAMMessageEventStream**
  - Write data that is transactionally consistent with the pipeline

BAM Architecture

- **TDDS Service and DTS allow moving of data asynchronously**

Using EventStreams To Write Data

- **Methods used on event streams:**
  - BeginActivity – called once to start tracking
  - UpdateActivity – called *n* times to write data
  - [EnableContinuation] – called when a module is done writing data, but the activity is not complete
  - [AddRelatedActivity] – called to create a relationship between the current activity and another activity
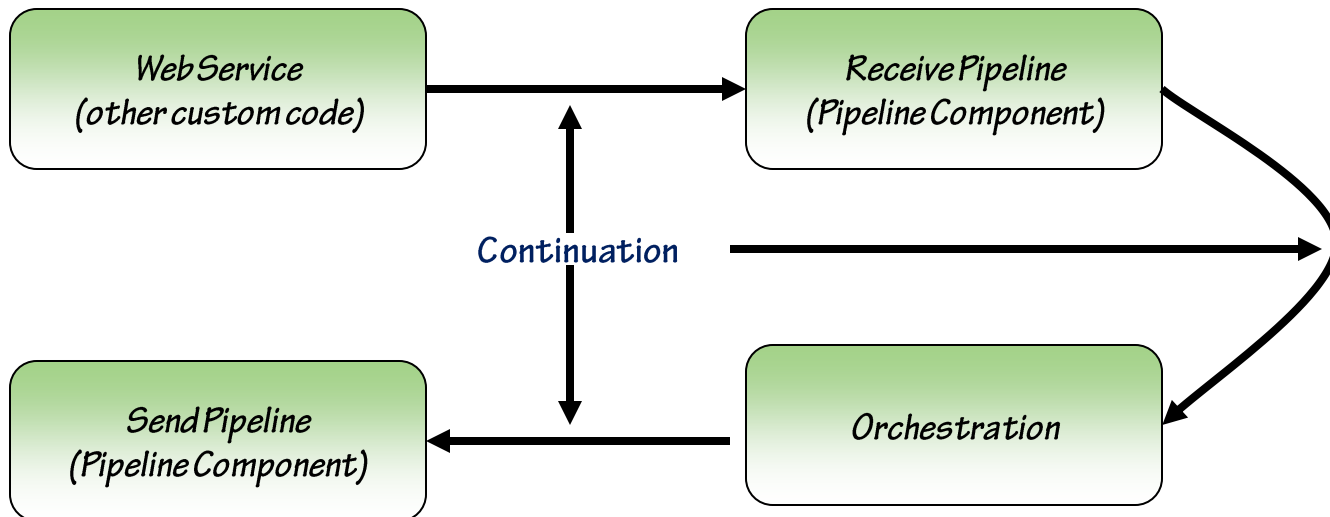 - EndActivity – called to close the activity

Writing BAM Data – Custom Code

- **Outside of BizTalk an event stream requires a connection string**
  - For BufferedEventStream use MessageBox database
  - For DirectEventStream use BAM Primary Import Database
- **IPipelineContext has a handle to the Message Event Stream**
  - IPipelineContext.GetEventStream()
- **OrchestrationEventStream provides static methods**
  - No need to instantiate
  - Don't have to worry about serialization or persistence in orchestration
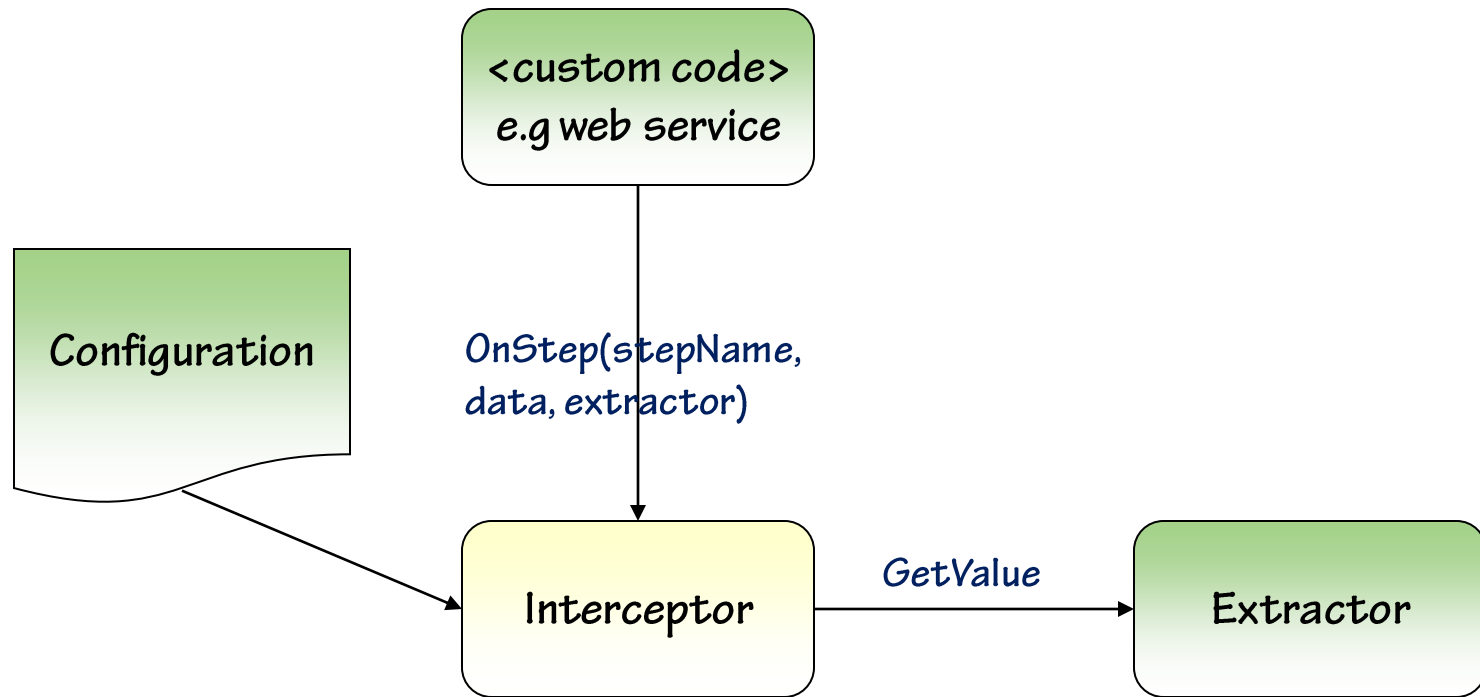 - No Flush() method as this is handled by the Orchestration Engine

Continuation

- **Necessary when you write data asynchronously to the same activity from different components**
- **Use a token to connect one activity ID to another**
- **Enable continuation linking activity ID to the continuation token**
- **Write data in the next module using the continuation token**
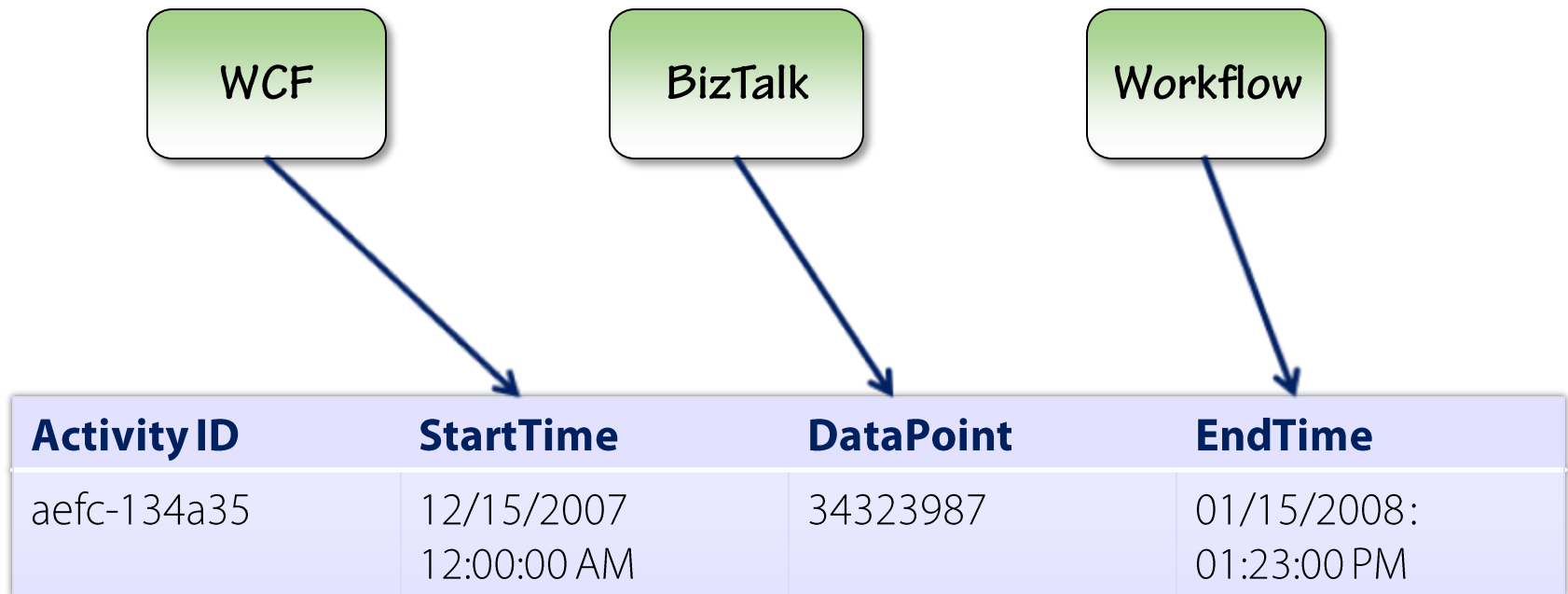
Configuring Data Collection

- **Hardcoding data collection values is not a good idea**
- **Need a tracking profile that code can use**
- **BAM provides mechanism for configuring your data collection**
    - Create the configuration/tracking profile
    - Indicate in your code where extraction can occur
    - Write code to perform the extraction

pluralsight
see what you can learn

BAM interception

WF and WCF BAM Interceptors

- **R2 release added WF and WCF interceptors**
  - Provide no-code method of collecting data from services and workflows
  - Allows business data collection across technologies for a single activity

Activity ID	StartTime	DataPoint	EndTime
aefc-134a35	12/15/2007 12:00:00 AM	34323987	01/15/2008: 01:23:00 PM

Reading BAM data

- **Read BAM data**
    - Excel Workbook (live data)
    - BAM portal
    - Create Reporting Services Reports
    - Provide interfaces over Analysis services data
    - Use BAM query web service

Querying BAM data

- **BAM Portal provides interface for users to query BAM data**
  - Users can *search* for activity instances
  - Connect to related activities or documents
  - Setup *alerts* to get notified of instance or aggregate conditions
  - View *Pivot tables* created in the Excel BAM definition process

Querying BAM data

- **BAM Web Services provide the same capabilities as the API**
  - Developers can create their own custom UI
  - Integrate BAM data into a client application
- **BAM Query Web Service is a simple wrapper over SQL queries**
- **Web Service is used by the BAM Portal to execute queries**

pluralsight
see what you can learn

Querying BAM – Direct Access

- **Direct access involves querying or building reports on SQL**
  - Best use is for reporting or simple viewing of data
  - Use Web Services and APIs for more advanced querying
- **BAM Primary Import database contains tables for all activities**
  - Active, completed, relationships and continuations
  - SQL Views created for each BAM view defined (plus default)
- **When querying the data directly**
  - use SQL views
  - Query the appropriate views (active/completed)
  - Query the aggregate view to get active and completed data

Summary

- **BAM provides metrics on the running business processes**
- **BAM definitions are generally created by analysts**
- **Definition used to create database infrastructure**
- **Developer defines the extraction of data**
- **Tracking profile editor is a powerful tool for configuring data extraction in orchestrations and pipelines**
- **Custom code can use the BAM API**
- **Several options for querying/viewing data**
  - Portal
  - SQL views
  - Web Service

Resources

- **GenerateTypedBAMAPI – Darren Jefford**
  - http://www.gotdotnet.com/workspaces/workspace.aspx?id=d3a0ec91-45b1-4c40-a729-bf448c712315

- **A review of BAM features**
  - http://msdn.microsoft.com/library/default.asp?url=/library/en-us/BTS_2004WP/html/1e2e50f7-6609-4eb2-a9a1-3a951700f840.asp