

Mashups for Composite Enterprise Applications

SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS



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- Who are We?
- Client is Becoming a Full-Fledged Tier
- Examples of Composition
 - Mashups, Composite Apps, and Service Platforms
- Industry Trends
- Enterprise Service Composition Platform
- Recent SAP Research Work
- Taxonomy for Composite Apps/Mashups
- Conclusions

- Researchers from SAP Palo Alto Research Center
 - Colleagues include Rainer Brendle, Tilman Giese, Ralf Güldemeister, Rama Gurram, Anne Hardy, Jan Schulz-Hofen, Brian Mo
- Our Mission: To research and experiment with emerging trends and new technologies that simplify creation, delivery and execution of enterprise applications
 - Web technologies, dynamic languages and programming environments
- This talk is about trends & experiments, not product directions

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- Client memory and processing power is impressive
 - For example, Smartphones may have 128MB RAM and 620MHz CPU
- Client can handle more than presentation
 - Browser is becoming an app platform with additional services and plug-ins
 - Plug-in as a Platform (PaaS)
 - Dynamic language libraries enable logic to be executed on the client (e.g., Microsoft Silverlight)
 - Controls can be deployed in standalone runtimes or in browsers (e.g., ADOBE AIR)
 - Rich controls can utilize client capabilities (video, sounds, etc.) in applications
 - Local data cache can be managed by client apps (e.g., Google Gears)
 - Capable of extending and managing data and display characteristics (via JavaScript/AJAX and proprietary APIs)

■ Client/Server in new clothes?

- Backend servers provide services that are primarily data-oriented
- Middle tier handles integration, transformation, dispatch and connectivity
- Client handles presentation
- Cross-Tier Aspects
 - Composition
 - Execution of Logic
 - Events/Messages

■ What are the implications ...

- ... for development, assembly and execution of Enterprise Applications?
- ...particularly for composite applications?

■ Components and Composition

- Must support flexible reuse
 - Preferably described by metadata
 - Fast development, composition and change
- Supply contracts for development, composition, and deployment
 - Different skills/roles for different tasks
- Provide simple syntax to compose multiple components into a composite
- Enable understanding composite apps based on:
 - Understanding semantics of individual components
 - Understanding composition operations

■ Examples:

- Unix pipes, Yahoo pipes
- Relational queries
- MTS, EJB and SCA frameworks
- Technologies for service composition and orchestration

- Mashups Today
- Composite Applications
- Service Platforms and Software as a Service (SaaS)

- **Achieves: Data aggregation**
 - Client side controls the aggregation (Google Maps API)
 - Client side relies on data-centric services from the server (get, update, delete, insert, replicate....)
 - Client devices perform asynchronous interactions (AJAX technologies)
 - Client devices side may utilize application specific data caches (SQLite, Google Gears)
- **Utilizes: Lightweight rapid development style**
 - Scripting and dynamic languages (JavaScript, Ruby)
 - Component metadata
 - Popular environments such as Yahoo Pipes
- **Succeeds:** Delivers the “Goals for Components and Compositional Frameworks”, described on Slide 6
- Compare [*Jonathan Marsh*]

- **Established:** Controlled by the client, with 2 distinct styles
 - Client side components and APIs (Google Maps)
 - Development Model: Use APIs to supply client side components with server-side data
 - Execution Model: Run components on client; fetch (async pre-fetch) data from server
 - Client side components and events (OpenAjax Hub, SAP Research Enterprise Web Widget Framework, IBM QEDWiki)
 - Development Model: Compose using events and metadata
 - Execution Model: Run components connected by pub/sub events
- **Emerging:** Server-centric composition
 - Use public APIs and interfaces to link services (WS/data-centric interfaces) to create a new service (WSO2/JackBe) in server
 - Server-centric approach makes mashups resemble traditional composite applications

- Focus in today's mashups is data-centric integration
- Data-centric integration doesn't require REST, but it aligns well with REST
 - Backend resources identified by URLs provide RESTful data services
 - RESTful approach enables efficient development and management of compositional apps
 - Development: Easy and intuitive programming model (avoids side-effects)
 - Management: Great for scalability, load-balancing, availability

- Service Integration is at the server [*SAP NetWeaver CE*]
 - Data/data feed aggregation is still important
 - Can compose new services using interfaces and metadata from existing services
 - Lightweight development still valuable but not critical
 - Enterprise Service Bus as one integration approach
 - Integrated services may be within same org or at a remote company
 - Runtime protocol bindings may be managed by frameworks
- SOA-ready services aren't enough for composing enterprise suites
 - Data integration, data management, transaction management, process integration, service level agreements, etc.
 - Replication, distribution and eventual convergence [*Pat Helland*]

- Service Platforms
 - Hosted services enable composition based on:
 - Generic services provided by the host; “Infrastructure as a Service”
 - Custom services supplied by individual tenants (hosted or non-hosted)
 - Multi-tenancy issues for SaaS include:
 - Virtualization: Sharing securely, load balancing, extensibility
 - Coupling: Coarse-granular services, service levels, context management
 - Encapsulated implementation offers migration advantages
 - ... but doesn't completely eliminate software versioning issues
- Which applications and services are suitable for hosted environments?
 - Amazon, Google, salesforce.com, SAP Business ByDesign, ...

■ **Metadata** enables composition, management and flexibility

■ **Component Descriptions**

- Interfaces
- Events published/subscribed to
- Backend data sources
- Cross-tier deployment capabilities
- Requirements for composition

■ **Policies**

- Authorization
- Protocol bindings
- Composition policies
- Cross-tier deployment requirements
- Quality of Service

■ **Composite application metadata**

- Description of composite services
- Description of composite data
- Events/message flows
- Derived policies and imposed policies for composites

■ **Examples: Component, Assembly and Deployment Descriptors for SCA and JEE; Widget Frameworks**

■ “Stateless” middle tiers

- Middle tier mediates service access, protocols, data representation, identity and other security
- Can also handle composition and intermediation (broker, mediator, gateway, aggregator, etc.) [*Alistair Barros*]
- Caching mainly as a performance optimization

■ End-to-end cross-tier deployment and optimization

- Leverages declarative metadata describing logic, data, components and compositions
- Enables different execution model for different client capabilities
- Manual optimization → (semi-)automatic optimization?



- Emerging Next Generation research platform addressing multiple aspects of cross-tier compositional apps
 - User experience and presentation
 - Data and service management
 - Business logic
 - Events and messages
 - Backend integration
- Utilizes dynamic languages and metadata, enabling flexible optimization
 - Deployment of compositional app can depend on configuration
 - Specification based on loosely-coupled components with constraints
 - Optimization determines “good” deployments and execution plans based on metadata
 - Entire lifecycle needs to be considered
 - Development, composition, execution, management, change

Learning from the past, guiding the present, inventing the future

- Prototype from Client Perspective

- User Interface
- Architecture

- Lessons Learned

- Taxonomy for Composite Apps/Mashups
- Conclusions



Repository & Metadata based Management

Composite App

Event Hub for Composites

Widget Repository

- Widgets
 - Uncategorized
 - BijouX
 - Event Hub Debugger
 - Widget Editor
 - Widget Repository
 - Theme Switcher
 - ContactManagement
 - Contact Browser
 - Contact Search Quick
 - Games
 - PacMan v2.6

Contact Search Quick

query:

Topic:

Publish:

Yalc

Event Hub Debugger

Topic	Data
bijoux.edit_saplet	"CMContactBrowser"
bijoux.contact_selected	"Jensen"
bijoux.contact_selected	"Yalc"
bijoux.edit_saplet	"CMSearchQuick"

Contact Browser

First Name	Last Name	Email	Telephone
Serhat	Yalcin		
Umit	Yalcinalp	umit.yalcinalp@	

Sort: Ascending / Descending / Columns

Widget Editor

```

New Open Save Import Versions

<widget xmlns="http://openajax.org/widget"
name="CMSearchQuick"
scope="CMSearchQuick"
category="ContactManagement"
height="40"
scalable="false"
title="Contact Search Quick">
<properties>
  <property name="query"
topic="bijoux.contact_selected" publish="true"
/>
</properties>
<content mode="view" type="frame">
  <![CDATA[
  <script><!--
    CMSearchQuick = function() {
      this.searchField = new
Ext.form.TextField({
  </script>
  </![CDATA[
  </content>
  </widget>
  
```

Third Party Apps

1. Contact Dev Team

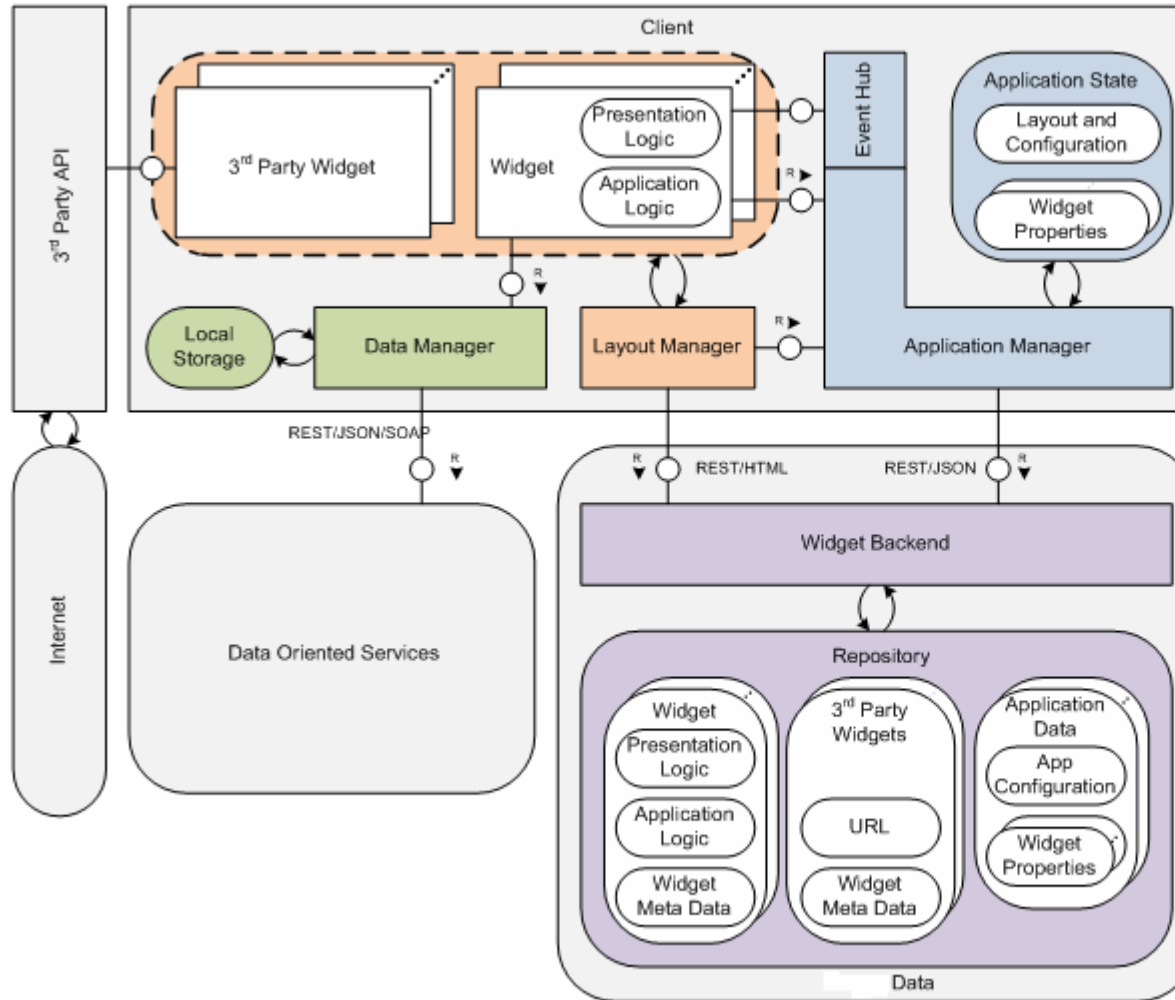
2. Prepare Talk

3. Type new task here

WeatherRadar

Click on map for local weather forecast

Map Sat Radar



- Client Framework**
- Application Manager
 - Layout Manager
 - Data Manager
 - Repository

Compare [Charlton Barreto]

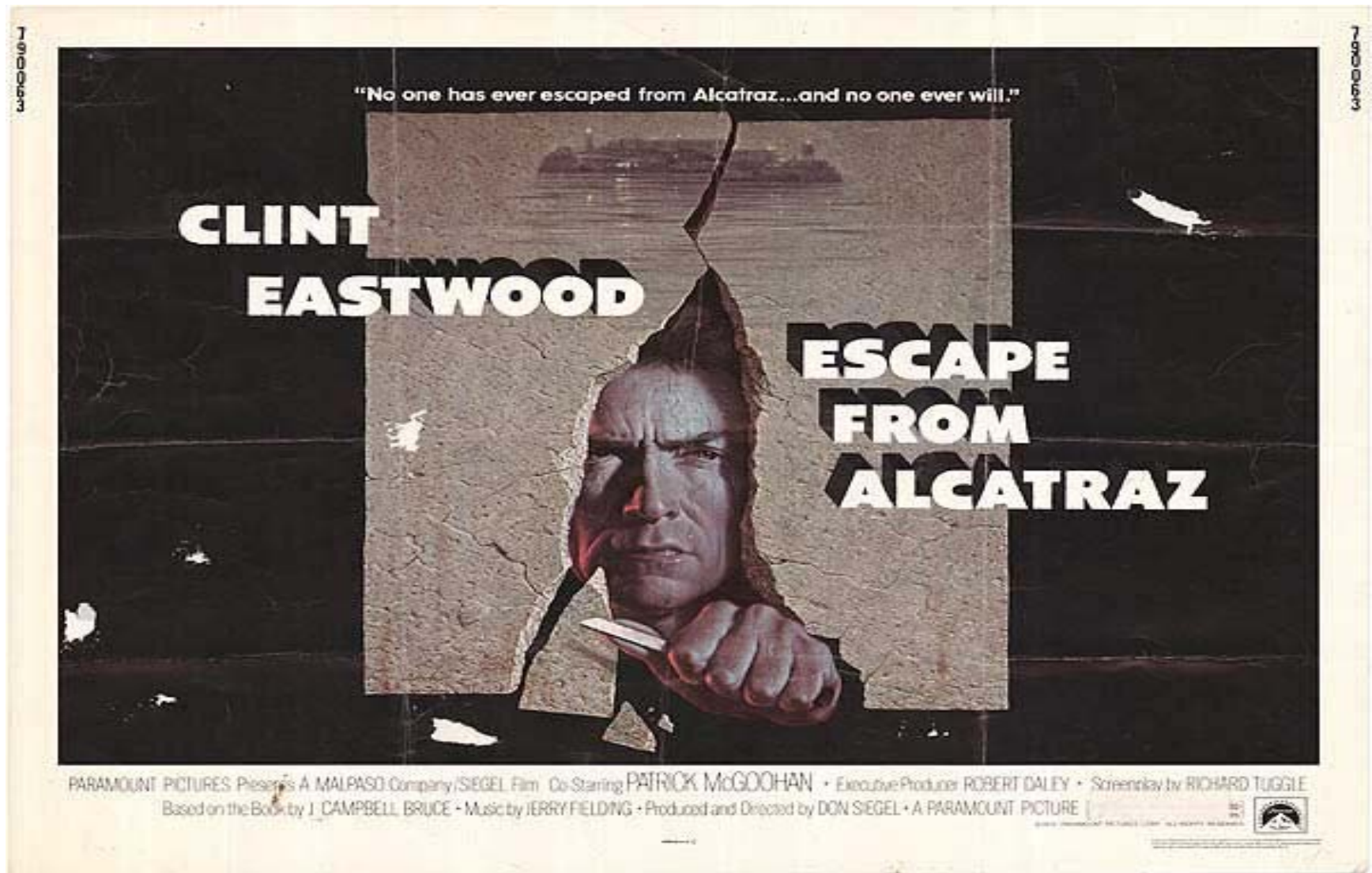
Taxonomy for Composite Apps/Mashups

A Spectrum with Multiple Good Answers



1. **Deployment:** Client; Servers
2. **Development:** Dynamic and lightweight; static and heavyweight
3. **Presentation:** Rich Internet Applications; rigid UIs
4. **Connectivity:** Must be connected; (occasionally) disconnected
5. **Integration Approach:** Data-oriented; Service-oriented
6. **Component Composition:** Events; APIs; compositional operations
7. **Programming Model:** Declarative metadata; imperative programming
8. **State Management:** RESTful; RESTless
9. **Data Management:** Loose consistency; tight consistency
 - Caching, async prefetch, versioning
10. **Service Coupling:** Loosely-coupled; tightly-coupled
11. **Process Integration:** Isolated; augmented; fully integrated
12. **Execution Plan:** Fixed; flexibly optimized based on system characteristics
13. **Service Delivery:** Packaged Software; Software as a Service

- For Composite apps, start from **What** you want to do, not **How** to do it
- Composite applications and mashups share a common taxonomy
 - Concepts are growing past adolescence
 - Clients such as browsers are a full-fledged tier
 - Dynamic languages enable lightweight composition
 - Component and composition frameworks should be metadata-driven
- End-to-end composite apps, deployed for cross-tier execution, are the next wave
 - Principles in SAP Research's Enterprise Service Composition Platform can help drive this
 - Taxonomy clarifies functionalities and tradeoffs
 - Enterprise qualities remain critical
 - Security, integrity, scalability, performance, availability, manageability, ...
 - Cross-tier optimization is an exciting future direction





- SAP Netweaver CE (Composition Environment)
<https://www.sdn.sap.com/irj/sdn/nw-ce>
- Sanjay Patil: *SCA Programming for the Enterprise Service Bus*
Presentation at this symposium
- Jonathan Marsh: *Mashup: Noun or Verb?*
<http://wso2.org/repos/wso2/people/jonathan/Mashup%20Noun%20or%20Verb.pdf>
- Charlton Barreto : *Web 20-20 Architecture for the New Internet*
<http://charltonb.typepad.com/talks/120407-cbb-web2020/Web2020TheNewInternet.pdf>
- Pat Helland:: *The Irresistible Forces Meet the Moveable Objects*
<http://blogs.msdn.com/pathelland/attachment/7082107.aspx>
- Alistair Barros: *The Rise of Web Service Ecosystems*
<http://csdl2.computer.org/persagen/DLAbsToc.jsp?resourcePath=/dl/mags/it/&toc=comp/mags/it/2006/05/f5toc.xml&DOI=10.1109/MITP.2006.123>



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