Enterprise Mashups with SOA

SYSTEMATIC THOUGHT LEADERSHIP FOR INNOVATIVE BUSINESS

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Outline

- Mission
- The Changing Computing Landscape
- Composition Characteristics
- Enterprise Mashup Application Platform
- Recent SAP Research Work
- Conclusions

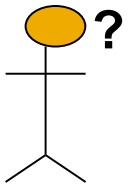
Mission:

- Simplify creation, delivery and execution of enterprise apps
  - Emerging technologies for the Web, dynamic languages and programming environments
- *Advanced Web Technologies group* at SAP Research, OCTO
  - Ümit Yalçinalp, Shel Finkelstein, Tilman Giese, Rama Gurram, Brian Mo, Matthias Kunze, Jennifer Baldwin, Anne Hardy …
- This talk is about trends & experiments, not product directions

Typical Application Architecture

- Presentation Layer
- Application/Business Logic Layer
- Data Access Layer

Traditional Web Applications



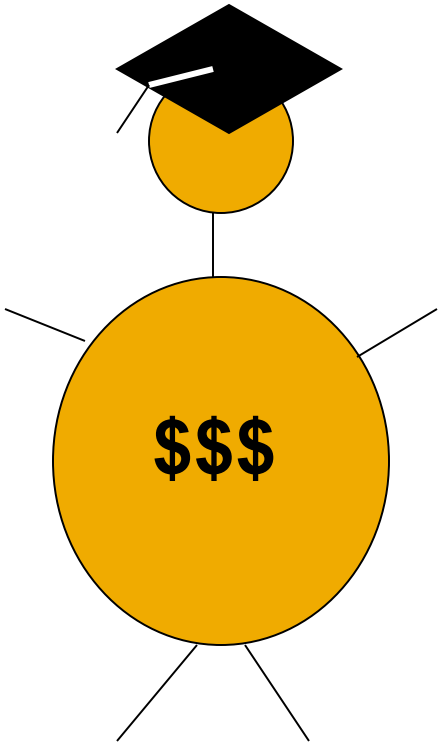
- Client
  - Displaying UI
- Web Server
  - Generation of presentation
- Midtier
  - Data integration
  - Composition
  - Business Logic
  - Validation
- Database

Today

Not (Client.isDumb()) and Not (Client.isThin())

New Clients

- Memory++ and processing power++
  - 128MB RAM and 620MHz CPU for smartphones
- Browser as an app platform **Plug-in as a Platform** (PaaP)
- Empowered by **Dynamic language runtimes** and proprietary APIs (e.g., Microsoft Silverlight, JavaScript libraries)
  - Client generates dynamic presentation layer
  - Client may include preliminary logic (e.g. validation)
- Deployment of same **controls** in both **standalone runtimes and browsers** (e.g., ADOBE AIR)
- Rich client controls (video, sounds, etc.) in applications
- **Local data cache** management by client apps (e.g., Google Gears)



Wealthy Client

The Pendulum Swings Back...

- Client/Server concepts are back: Refresher for your memory
  - Clients responsibilities may include
    - presentation layer creation/management
    - execution of some business logic
    - integration
  - Middle Tier handles integration, transformation, dispatch, connectivity
  - Backend Servers provide services that are primarily data oriented

- Responsibilities on either client or server
  - composition
  - execution of business logic
  - events/messages

http://www.sp-studio.de

What are the Implications for Enterprise Applications?

- Use client as a real SOA tier
  - Offloads server
  - Crucial for user experience
  - Composition
- Design services to exploit wealthy clients
  - Utilize their characteristics and full potential
  - Make integration possible
  - Distribute application responsibilities
- Enterprise applications require new distribution of responsibilities across
  - Development
  - Assembly and composition
  - Deployment
  - Execution

Where are these capabilities?
They may be in the client, server or both

Goals for Components and Compositional Frameworks

- Must target the following
  - Flexible reuse
  - Fast development, composition and change
- Utilize rich metadata
- Supply contracts for development, composition, and deployment
- Define different skills/roles for different tasks
- May provide binding to different environments
- May be assembled to a composition by
  - Simple syntax/templates
  - Declarative languages/operators

Examples

- **Unix pipes**
- **Yahoo pipes**
- **Relational queries**
- **SCA**
- **EJB**

Composition Trends for Enterprise Apps

- Three Approaches:
  1. Mashups
  2. Composite Applications
  3. Service Platforms and Software as a Service (SaaS)
- Taxonomy for Enteprise Applications
  For more info on 2, 3 and the taxonomy, see:

`http://events.oasis-open.org/home/sites/events.oasis-open.org.home/files/MashupsForCompositeEnterpriseApps.pdf`

Mashups Today

- Driven by Client side development
- Composition is handled on the client
- Lightweight and rapid development style
  - Scripting and dynamic languages (JavaScript, Ruby)
  - Component metadata
- Browser as a container enables rich client
  - *Plug-in as a Platform* enables wealthier client

Two Styles of Client-side Composition

- Composition with APIs
  - **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

  (Google Maps)

- Composition with events
  - **Development Model:** Compose using events and metadata
  - **Execution Model:** Run components connected by pub/sub events

  (OpenAjax Hub, SAP Research Enterprise Web Widget Framework, IBM QEDWiki)

Not mutually exclusive

Services for Client-side Mashups

- **Data services** for data aggregation and integration
  - Data Access (get, update, delete, insert, replicate,…)
  - Data API (Google Maps API)
  - Asynchronous Updates (AJAX)
  - Routing for multiple domains
  - Lifecycle beyond service interaction (SQLite, Google Gears)
- **Pub/Sub event services (on Client)**
- **Metadata services (from Server/from Client)**
  - Component and composition descriptions
  - Repository access

We are entering a new world where

data may be more important than software

Tim O’Reilly

Data-centric Services

- Focus on CRUD (Create, Retrieve, Update, Delete)
- Expose logical view of data
  - Can be coarse granular, aggregated or composed from distributed backend services and sources
  - Provide a unified facade for client consumption
  - May have explicit relationships among themselves
- Well aligned with **REST**
  - Data-centric design yield identifiable data resources
  - Resources can be identified by URIs
  - Resource Oriented Architectures does not need to clash with WS centric SOA
- Where is the application logic?
  - Can be implemented on client, server, or both

An Emerging Trend: Are Server-side Compositions also Mashups?

- Create a new service from existing services
  - Use public APIs or interfaces to link services (WS/data-centric interfaces)
  - Expose new service with standards
- Server-side mashups
  - Resemble traditional composite applications
  - Use scripting/lightweight composition
  - Avoid cross-domain composition issues (Addresses browser-specific problem)
- Data-centric composition is still the focus
  - Use WS based composition to create/expose a new WS
  - WS Orientation does not contradict REST aligned design
  - Works when composed services do not address presentation
- Examples: WSO2, JackBe

Mashups are Successful

- Achieve “Goals for Components and Compositional Frameworks”, described on Slide 12
- Lightweight development
  - Scripting
  - Dynamic languages
- Key enabling services:

  Server side data services +
  Consumer side events +
  Metadata repository

Trends for Composition

- **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

Trends (Continued)

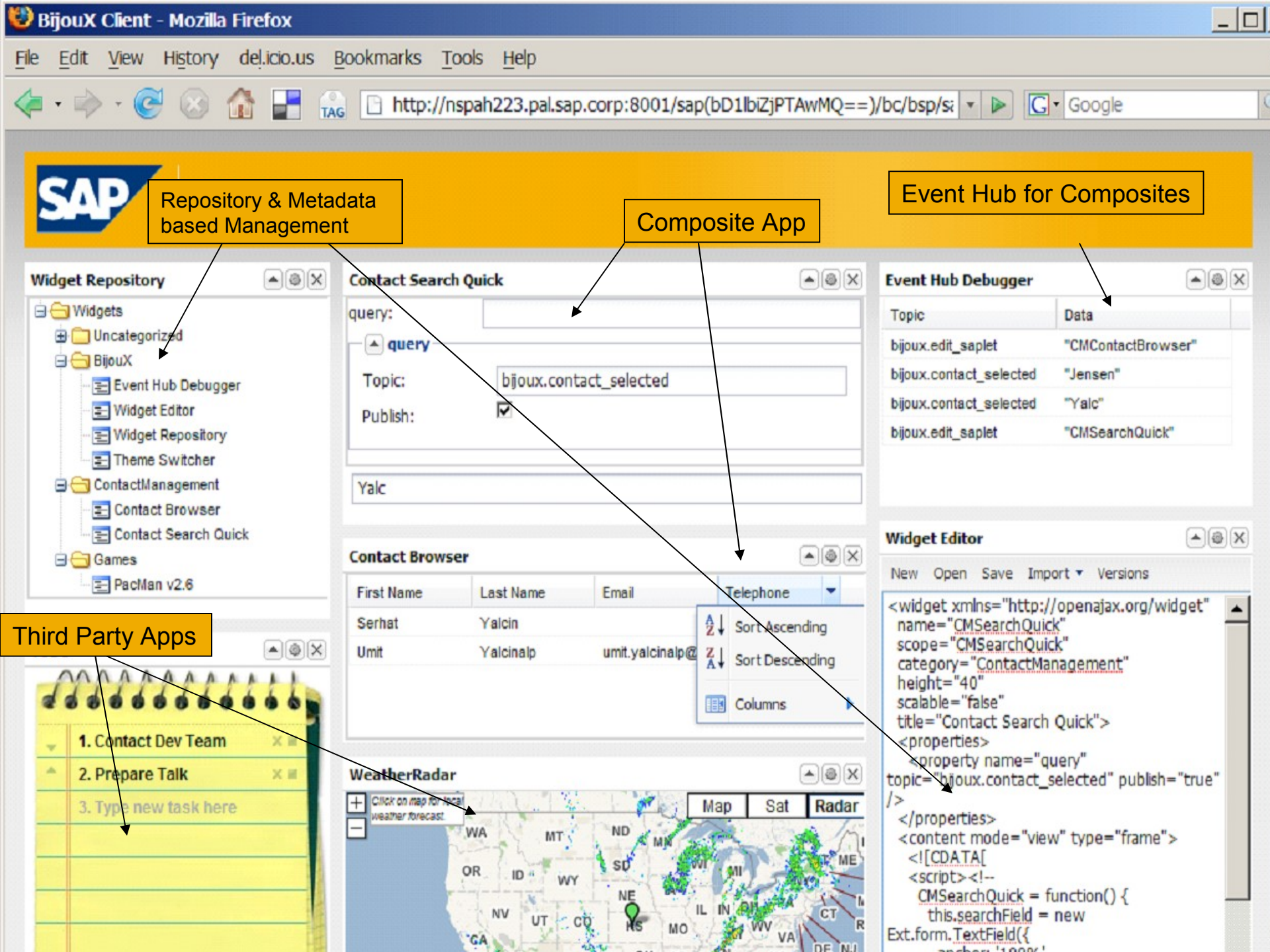
- **"Stateless" middle tiers**
  - Mediation of service access, protocols, data representation, identity and other security
  - Handling of composition and intermediation (broker, mediator, gateway, aggregator, etc.)
  - Caching simply for performance optimization
- **End-to-end cross-tier deployment and optimization**
  - Leverages declarative metadata describing logic, data, components and compositions
  - Enables different execution model for different client capabilities
  - Allowing logic to run in different tiers
  - Manual optimization → (semi-)automatic optimization?

Enterprise Mashup Application Platform

- Research platform for cross-tier compositional apps
- Focus Areas
  - User experience and presentation
  - Data and service management
  - Business logic
  - Events and messages
  - Backend adaptation
- Dynamic languages for creating, consuming services
- Metadata centric, enriched with metadata services
  - Widgets
  - Property based composition
  - Pub/Sub
- Ultimately cross-tier optimization is our goal

Research Experience: *Learning from the past, guiding the present, inventing the future*

- Taxonomy for Composite Apps/Mashups
- Data Services are well aligned with REST
  - Do not need protocol transformation, extra binding
  - Simplicity is very appealing
  - JSON serialization enables fast data binding
  - Used for both data and metadata services
- Client side Pub/Sub eventing enables lightweight composition
  - More flexible than FIXED interactions between components
- Property driven composition is declarative, easy to manage
- "Zero deployment" client is desirable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2. Prepare Talk
3. Type new task here
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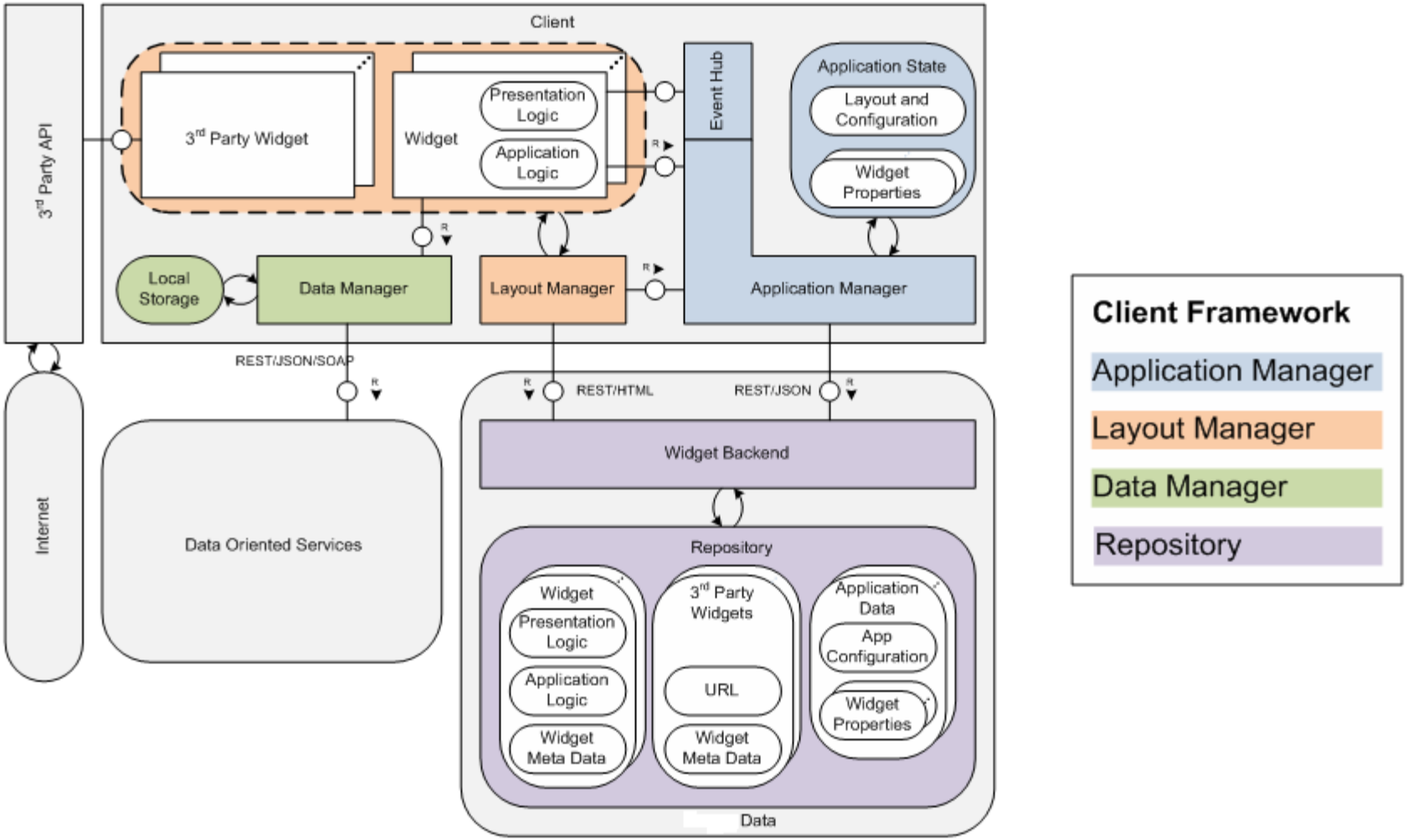
Client Perspective of Mashup



Conclusion

- Composite applications and mashups share a common taxonomy
  - Concepts move between tiers
  - Clients such as browsers are a full-fledged tier
  - Dynamic languages enable lightweight composition (client and/or server)
  - Metadata driven component and composition frameworks are more adoptive
  - In today's mashups data-driven services are central to composition
  - Client-side event bus enables composition
- End-to-end composite apps, deployed for cross-tier execution, are the next wave
  - How to distribute logic is not a finalized question
  - Enterprise qualities remain critical
    - Security, integrity, scalability, performance, availability, manageability, ...
  - Cross-tier optimization is an exciting future direction

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