Next Generation IT Systems 2006 – An Enterprise Perspective

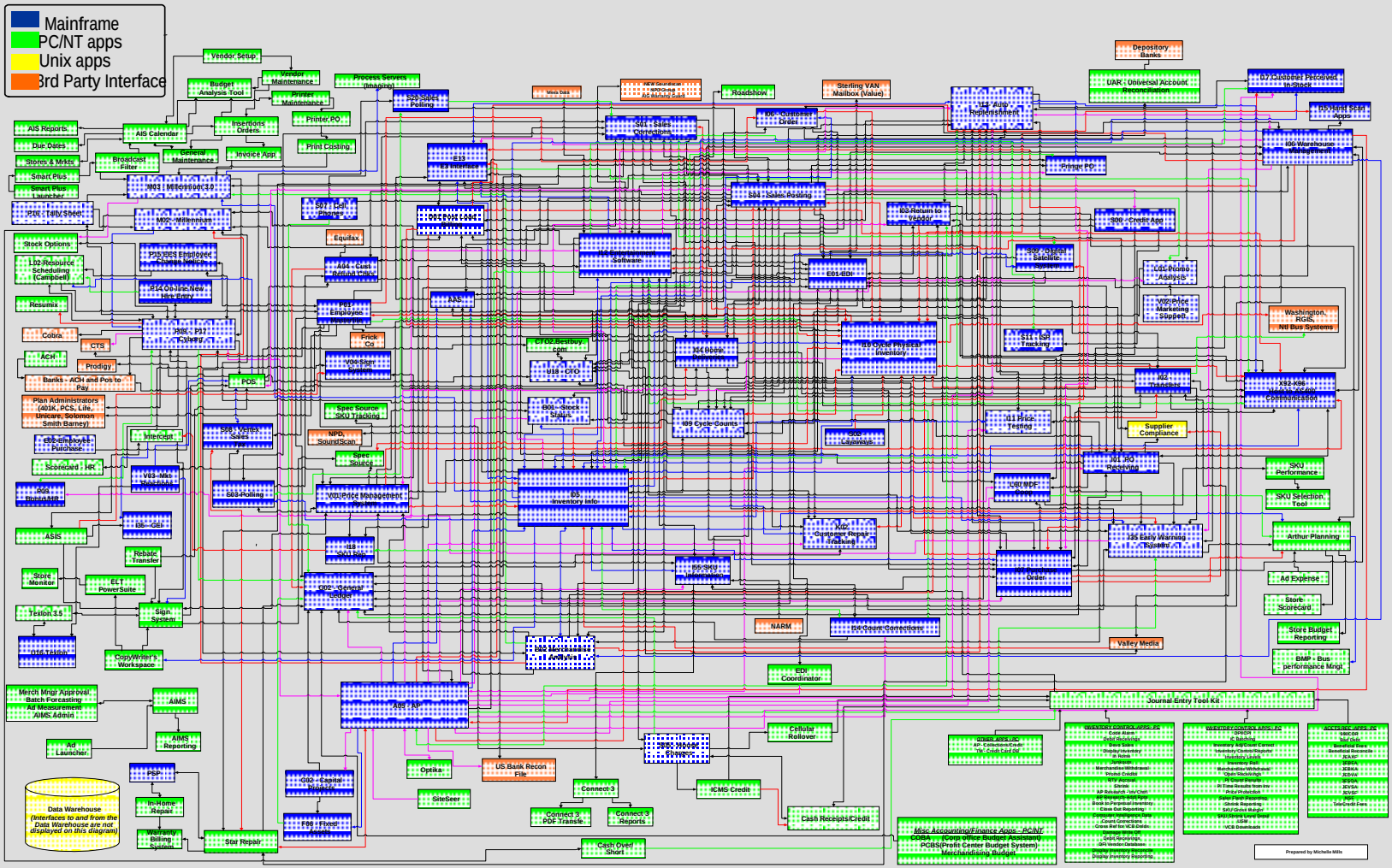
Dr. Donald F. Ferguson

IBM Fellow
Chief Architect, IBM Software Group
Chair, SWG Architecture Board
Co-Chair, IBM Asset Architecture Board
dff@us.ibm.com

Contents

- This is an *enterprise* perspective
  - What are a few trends in our industry?
  - What are the implications for IT in medium and large enterprises?
- Due to time, the presentation has a limited focus
  - What will happen *next.* Not general long-term predictions.
  - Selective, and will not cover many other trends.
- Two related, major trends that interest me
  - SOA and Web services evolution
  - Everyone can program → situational applications
- Some additional next generation IT system trends

Example: Complexity is Forcing Change



Actual Application Architecture for Consumer Electronics Company

What is …..?

… a service?

A **repeatable business task** – e.g., check customer credit; open new account

… service orientation?

A way of integrating your **business as linked services** and the outcomes that they bring

… service oriented architecture (SOA)?

An IT **architectural style** that supports service orientation

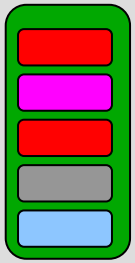
… a composite application?

A set of **related & integrated** services that support a business process built on an SOA

What's this "Service Thing?"

"That's my simul. package!"

WSDL



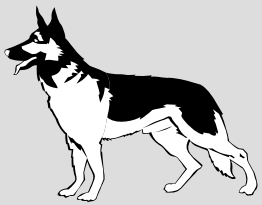
Message M1, M2, … …
Op1, inMsg1, outMsg1, faultMsg1
Op2, inMsg2, outMsg2, faultMsg2
… … …

"Dude, that's an EJB"

"*You whipper snapper, we Invented that in IMS in 1923.*"

".NET. I like it."

Narr! Das ist eine IDOC



"Those lying IMS swine. That's CICS."

SOA and Web Services

- SO***A*** is an *architectural* style following some principles
  - Input and output messages completely describe behavior → No private signaling or shared data.
  - Coarse grain interactions, unlike OO.
  - Self-describing, cataloged, well-defined messages
  - etc.
- SOA "resonates" because many customers have been doing it for years. SOA codifies a set of *best practices* for
  - Message Driven Processing (MQ).
  - SessionBeans and the Transfer Object Pattern
  - CICS TP Systems
- Web Services are a set of standards for SOA
  - Enable interoperability between infrastructure (middleware), and between different development tools.
  - Eliminates the need to integrate the infrastructure before integrating business logic to form new, composite applications.
  - SOAP/HTTP
  - WSDL, WS-Policy, specific policy assertions, BPEL4WS
  - ***Like "Diplomatic French" or "Esperanto"***

Implementing Services – The Next Generation of SOA Standards

- *Web services currently says little about how to **implement services.***
  - What are the standards?
  - What is the process guidance?
  - What are the best practices and patterns?
- There is a next generation of standards
  - Service Component Architecture
  - Service Data Obects
- The standards enable flexible IT solutions
  - Rapid, simple **composition** of new **composite applications.**
  - Configuration/customization of solutions
  - Portable services, modules and solutions
  - Role/skill/task/specific services

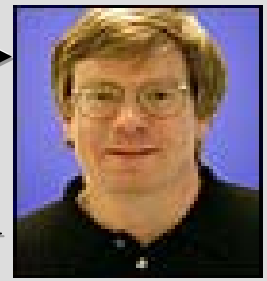
Simplifying Development

Daddy,
Mommy gave me these
documents to convert.

What type of EJB
do you want to build?

Um. I do not want to build
an EJB. You see, Mommy gave me these …

Maybe you didn't understand the question.
Your choices are SLSB, SFSB,
CMP Entity, BMP Entity, MDB



You're not very nice.

- This is crazy.
- Programmers want to build a "part" that implements a "basic building block" and then aggregate them together

Process Guidance and Service Impl. Kinds

- Each step in SOA development has an ***intent***
  - Expose some data through SOA
  - Write simple new business logic for a simple task
  - Implement business logic using business rules
  - Process events using a (state, event, action, state) model
  - Choreograph a set of services into a new service
- There are “kinds” of service implemention
  - Support each intent
  - Concepts and tools specific to
    - Role
    - Skill
  - Process guidance for selecting specific kinds
- Answering “How do I …” with “It depends” → ***Complex*** → ***Guide and simplify choice***

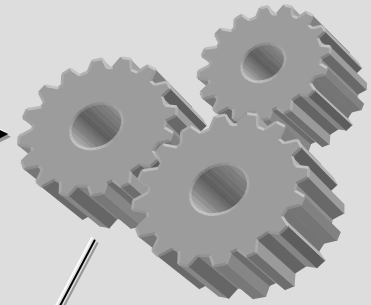
A Simple Example and Some Concepts

Something a DB dude recognizes

Author Tools
or
Text Editor

```
/*
Pragma This;
Pragma That;
*/
SELECT
        ticker,value, activity
FROM
        StockQuotes
WHERE
        ticker == QuoteRequest.ticker
INTO
        quoteResponse.ticker
        quoteResponse.value,
        quiteResponse.sharesTraded;
```

Deployment Tools



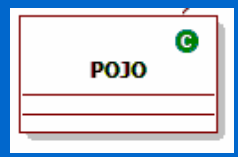
Deployment Package

SDOs

```
public class            QuoteRequest {
        String                  ticker;
        Date                    when;
}

Public class            quoteResponse {
        String                  ticker;
        float                   value;
        float                   sharesTraded;
}
```

Interface(s)



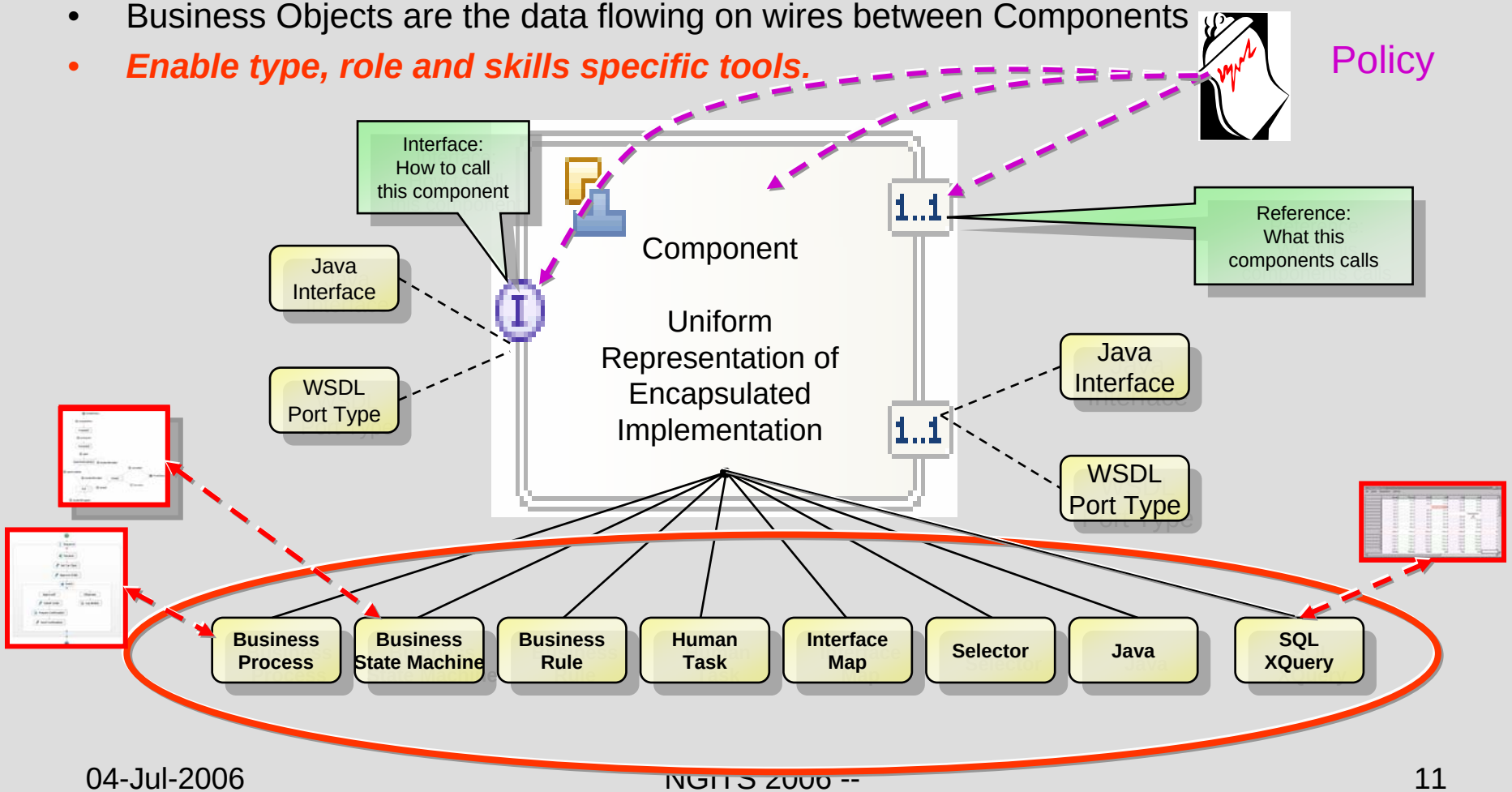
Data Svc.

Generated Code
Interpreted Metadata

Service Components

"Web services describes the outsides. How do you implement a service? How do you compose services?"

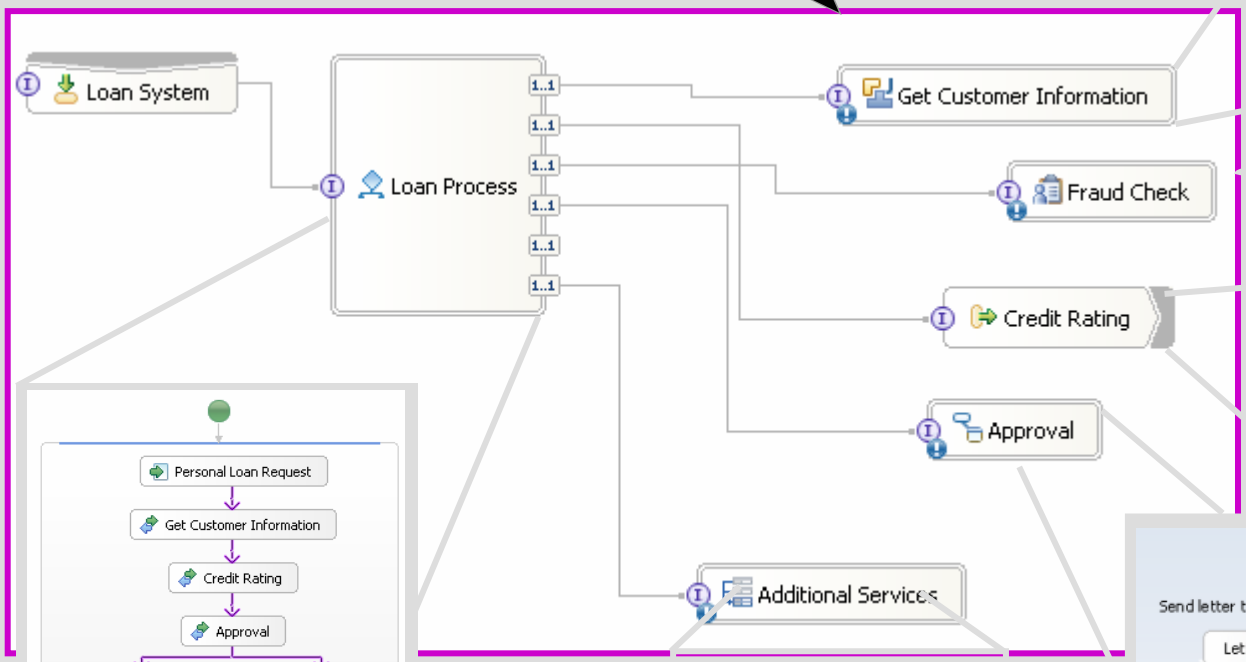
- Encapsulate Components for Reuse; All look the same from outside
- Components may be wired together and aggregated via flow
- Business Objects are the data flowing on wires between Components
- ***Enable type, role and skills specific tools.***



Assembling Services – Modules and Subsystems

UDDI, Service Registry
Project, SCCS
ad hoc exchange

Build a module
or
Subsystem



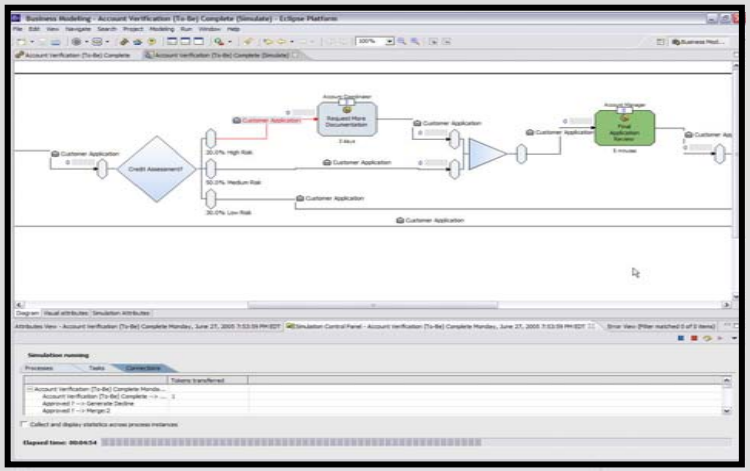
get Approved

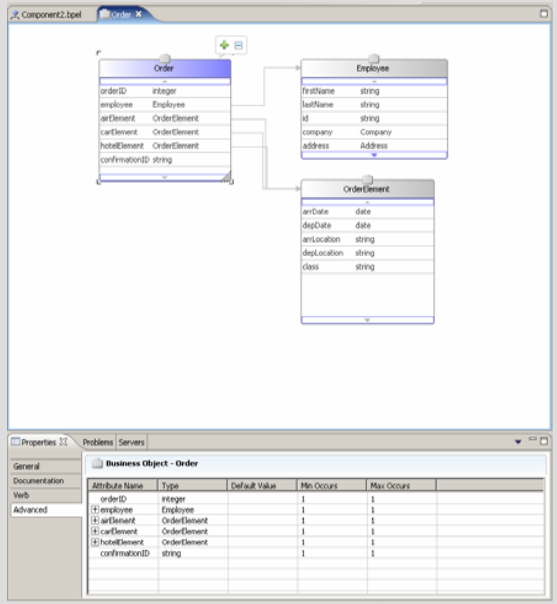
Approved/
Denied

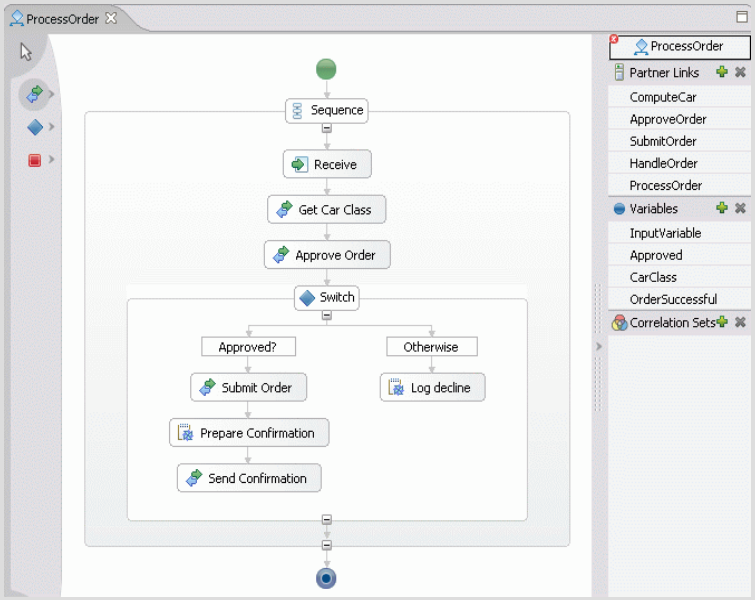
If Approved then
Send letter offering
gold

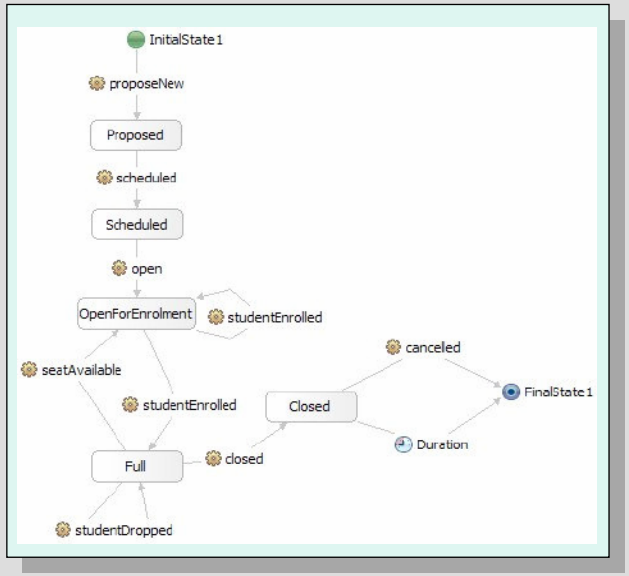
If NOT Approved
Send letter offering
Credit counseling
service

Some Examples









Some Perspectives

- SOA
  - SOA is a mature, widely practiced architecture model
  - Web services are a set of standards for interoperability, tool federation and portability
- Business Value
  - Relatively dynamic assembly: Process, Structure
  - Relatively dynamic customization
    - Add new services
    - Version/content aware binding and routing
    - Dynamic modification of rules and policies
  - Simple model for declarative business events enable business insight
  - Virtual enterprise

Some More Perspective

- Haven’t we heard this before? OO, RPC, MDP, … …
- There are some differences
  - XML is language neutral;
    previous approaches implied a language model.
  - WSDL and XML are more forgiving of changes
  - Supports RPC and message/document approaches from beginning
  - Common type model for application servers, message systems and DBs
  - Builds on Internet protocols already deployed for “Web browsing.”
  - Uniform model for events/pub-sub, message routing and RPC

Everyone Can Program

- Some anecdotes
  - I study karate
    - I have a black belt
    - Don’t let the affect your appraisal of my presentation
    - There are a lot of high school students
  - One “kids” wrote
    - A Microsoft Access application
    - Tracks students class attendance
    - Uses a bar code scanner
    - Prints reports
  - Kids in the locker room know I work for IBM
    - Tell me about their cool PHP, Perl, … …
    - Tell me about their cool, dynamic Web sites
- Everyone can program the way we learned long division.

What Are the Implications?

- Current “IT” Model
  - The “data center”
    - Runs a relatively small number of applications
    - For a relatively large number of employees or customers
    - The applications change very slowly, to support QA
  - LOB, department or team have “immediate” need for some new functions
    - Respond to a complex RFP/RFP collaborating with new partner
    - Complex trouble ticket that needs a new team
    - Extend the managers workspace in in a store to integrate with local carpet installation, electricians, cabinet makers
  - What to do?
    - Submit a plea to the IT department or ISV for a change
    - Have the priests of programming make the change
    - Have the data center teams run QA
- Well,
  - The business need is no longer there
  - But, I have a 25 year old who can program “mashups” or LAMP
  - The new “teenagers” have the attention of a ferret on an espresso.
  - They will not wait for the priests

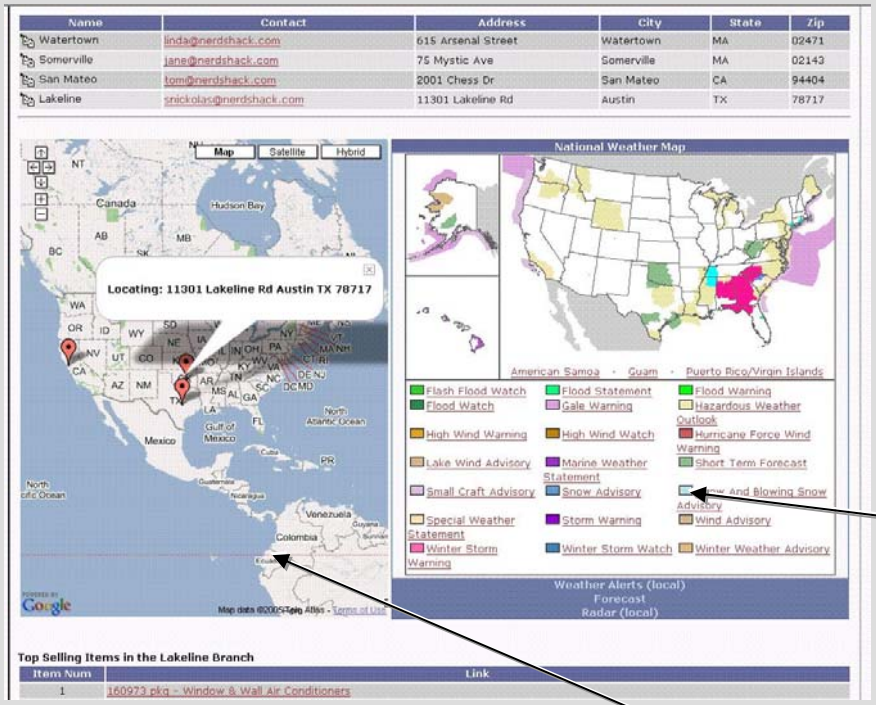
A Some Simple Scenarios

- Severe weather – Meet Dave, an insurance agent.
  - He sees a news report of a severe storm. What is the company's risk?
  - Dave writes a simple script to retrieve affected zip codes and rainfall.
  - Uses an Excel control fronting Web services to retrieve insured properties;
    Filter and select only properties insured for more than $250,000.
  - Pass rainfall predictions to ESRI to compute floods level at properties.
  - Email a risk summary to executives.
- Emailing documents is frustrating
  - Changes upon changes upon changes upon comments
  - Multiple versions
  - I don't have the right editor
  - Dave will make his "reports" a wiki page that refreshes the data
    - Sever side "mashup"
    - LAMP
    - Have the application refresh when the forecast changes, using feeds.

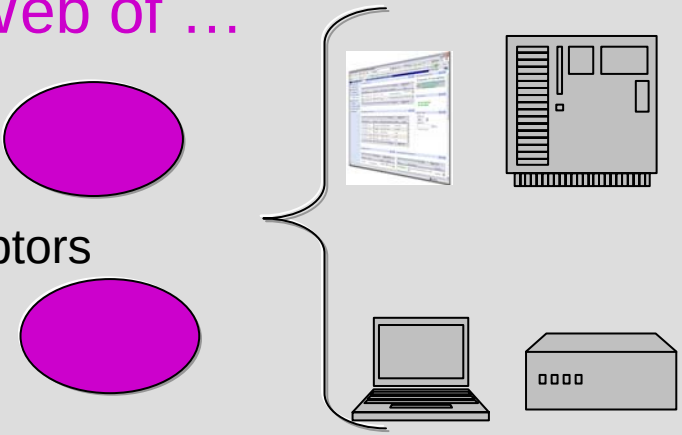
A Simple Scenario

- This may *seem* to require complex programming skills, but it does not.
  - Feeds, URIs and simple REST retrieval of form like data are not dissimilar to including Access data in a spreadsheet.
  - Passing information between the various “parts” is similar to spreadhseets, references and formulas.
  - Very simple scripting to sequence actions
  - Use of basic primitives, like print and e-mail the form.
- This is a new composite application
  - Composes public data
  - Composes data and behavior in operational, enterprise systems
  - Sequences steps
  - Supports user interaction
  - Derives new results

Application Wiki Example



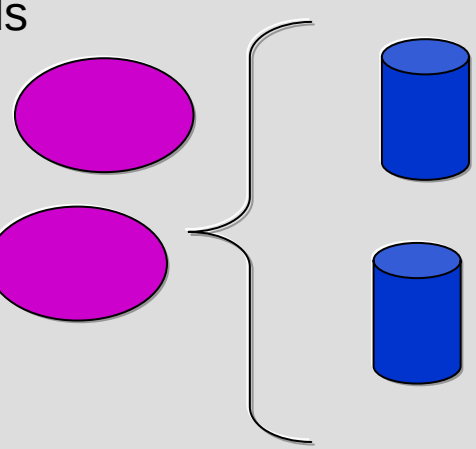
A Web of …



Adaptors

New Logic

Feeds

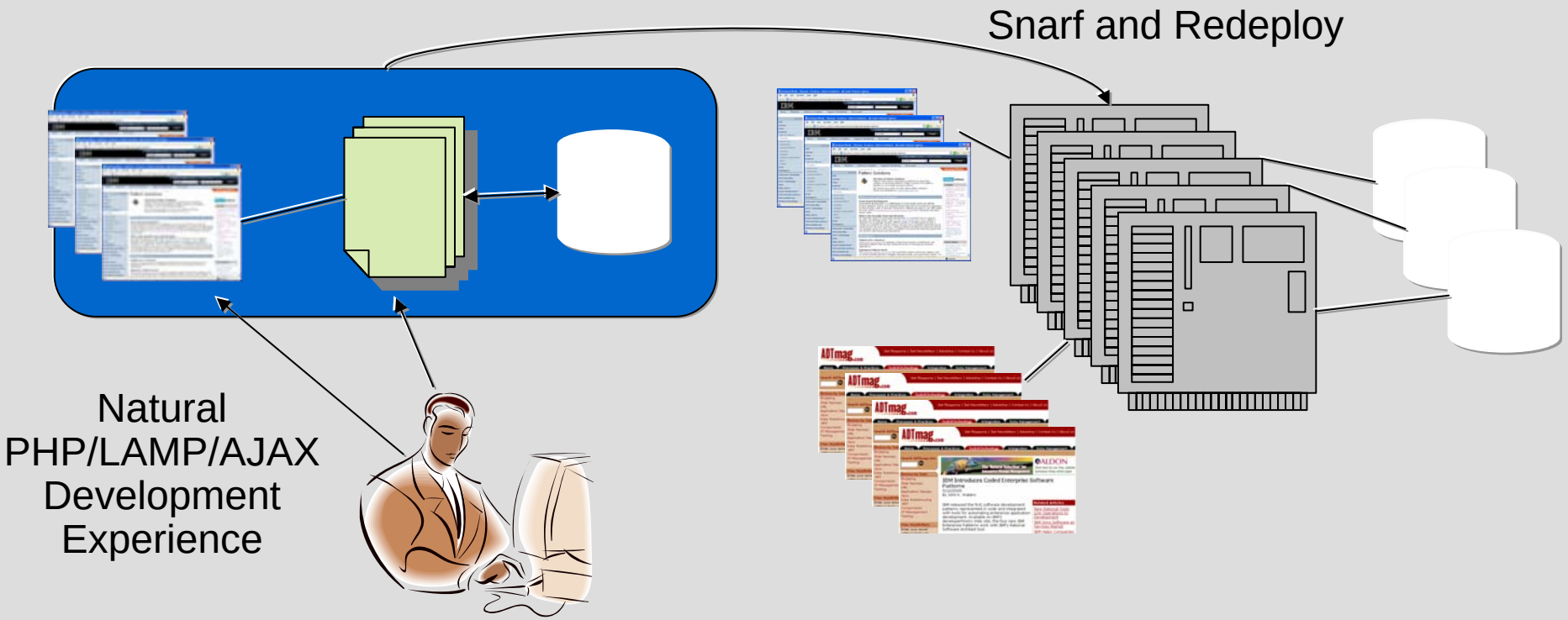


Several composition models

- Wiki + controls
- Web Spreadsheet
- Merged formed/feeds
- Scripts + HTML

Micro-formats
REST, Feeds
Exemplars

Lines of Business and IT



- LOBs and casual application developers build and test applications, perhaps
  just in time applications.
- Pressures will drive application redeployment into IT center
  - Governance and compliance
  - Server management is a drag
  - Publication outside the enterprise

The “Data Center of the Future”

Is radically different from today

- Applications are like Word or email
  - Moving from 100 applications → 100,000 applications
  - 1000 new applications per day
  - 10,000 modified applications/data
  - An application is for three of four people
- Defines a completely new “application server model”
  - 100,000 “VMs”
  - Many, many programming models with
    - Integrated, open source frameworks
    - Certified for “virus free” and “IP clean”
  - Focus on governance tracking {app. Version, data in, data out} → “Why did I deny this claim?”
  - “Protect the mainframe! Protect SAP! From the Web crazies”

Some Additional Trends and Ideas

- SOA and Event Driven Architectures
- Recipes, Patterns and Templates
- What happens when
  - HW is free (multi-core, multi-HW thread, blades, …)?
  - Everyone can program?
- Standards evolve
  - Simple, portable, open source programming model →
  - Domain formats and standards, and common processes
- High performance, distributed, real-time event driven architecture and SOA/Web services converge and run in the network
- Management of Web Services and Management Using Web services.
  - Application governance
  - IT management is a *business process/composite application.*
- Business Process Management includes **business policy mgmt.**