The Path to Oracle Fusion Using a Thick Database Approach

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What you will get out of this presentation

(This is NOT an Oracle approved message)

- All of the different things that “Fusion” means

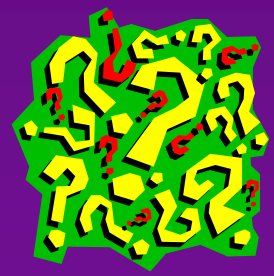
What parts of Fusion are worth learning about

  - DBMS, OAS, ADF BC, ADF Faces

- Which parts can be ignored
  - BPEL, BAM, Oracle Business Rules
- Explanation of the "thick database" approach and its benefits

Background

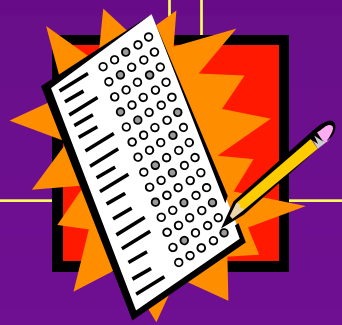
- Fusion technology stack is large and complex.
- Hard to make the transition into the J2EE environment.
- Host of different tools, programming languages, architectures, and technologies
- Projects often have the illusion of progress.
- Building functioning, scalable production software often becomes an impossible task.



Survey

- Non-Oracle DBMS
- Non-J2EE Application Server
- Apps user
  - PeopleSoft
  - JD Edwards
  - Siebel
  - eBusiness
  - None/other
- Web technology
  - J2EE
  - .Net
  - Other

- J2EE IDE
  - JDeveloper
  - Eclipse
  - Other
- J2EE persistence
  - ADF
  - EJB
  - EJB3
  - TopLink
  - Hibernate



Oracle Architecture

- First-rate Service Oriented Architecture (SOA)-centric environment.
- Built from an OO developer's perspective:
  - Lacks much of the vision that would make Designer users comfortable
  - "Not-so-subtle" encouragement to place business rules enforcement in the middle tier, coded as Java
  - Can be used to articulate data-centric complex business processes, using portions of the architecture
  - Business Process Execution Language (BPEL)
    - Can lead to applications with poor performance because of the number of round trips needed between the middle tier and the database.

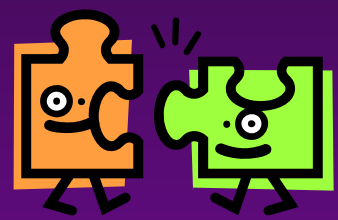
Fusion: What is it?

- In addition to e-Business, Oracle has purchased:
  - PeopleSoft (previously bought JD Edwards)
  - Siebel
  - Retek
  - AND…
    - Agile, Bharosa, Bridgestream, Netsure Telecom, TimesTen, Context Media, G-Log, Oblix, TripleHop, ProfitLogic, i-flex, Innobase, Thor Technologies, TempoSoft, OctetString, 360Commerce, Sleepycat, HotSip, Portal Software, Demantra, Net4Call, Telephony@Work, Signma Dynamics, Sunopsis, MetaSolv Software, Stellent, Hyperion, AppForge, SPL WorldGroup, Tangosol, LODESTAR
- Collectively > 200,000 database tables
- 500,000 million lines of code

Now what?

Oracle Fusion

- Will be based on the e-Business data model
- Features of other packages will be migrated into e-Business.
- Migration path from PeopleSoft, JD Edwards, Siebel
  - Impossible to automate
  - Very expensive
  - Ultimately essential



- Oracle cannot maintain all product stacks indefinitely.
- Fusion – V1 release scheduled for 2008
  - Will include the next major release of the e-Business suite using Fusion Middleware

Fusion Middleware Definition

Marketing term for "All products under development management"

Includes lots of stuff you should not care about at ALL!!

- Fusion
  - OAS
  - JDeveloper
  - Developer
    - Forms
    - Reports
  - Designer
  - XML Publisher
  - BPEL
  - BAM
  - Business Rules Engine

- Non-Fusion
  - Application Express
  - PL/SQL
  - SQL
- Recently everything related to development is Fusion Middleware
  - TopLink/Swing Integration
  - EJB3

Two Goals of Fusion Middleware

1. Support Oracle Fusion
   - Clear development path
   - Tactical focus
   - Strategic support
   - HAS to work
   - Limited scope

2. Support all J2EE development
   - Market driven
   - Lots of pieces
   - Speculative
   - Ill-defined scope

Pieces in support of Fusion are safe.

Pieces in support of marketing are market-driven.

Getting there: Fusion

- Count on a significant conversion effort sometime within the next 5 years.
- New modules should be e-Business
- Move to Oracle DBMS
  - Server-side PL/SQL
  - Oracle Business Rules engine is in the DBMS.
- Move to Oracle Application Server
  - Probably make life much easier

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"Fusion Development Technology" (FDT)

- Not an Oracle term (but it should be)
  - Subset of Fusion Middleware
- The technology used in Oracle Fusion
- For the first time in Oracle's history, development is THE critical success factor.
- At Collaborate '06, Charles Phillips' keynote was "Fusion."
  - He never even mentioned the DBMS.
- Oracle is betting the farm on FDT.
- FDT is already good, and has all of the resources that it needs to become great.
- Will have a blank check for years to come
- This is what you really need to know.

Fusion Development Technology Parts

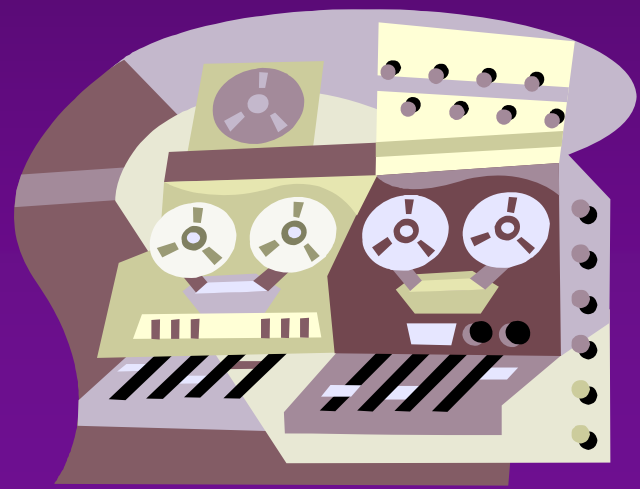
- OAS
  - J2EE application server
  - First-rate product
  - Mature
- Application Development Framework – Business Components (ADF BC)
  - Persistence layer
  - First-rate product
  - Recently revamped
- ADF Faces
  - Next generation UIX
  - Somewhat proprietary
  - Feels “new”
  - Hard to go beyond framework
- BPEL
  - Recent addition
  - Hot standard for inter-system process
  - Not sure where it fits
- Oracle Business Rules
  - No idea what to do with this
- DBMS, PL/SQL, SQL

Oracle Application Server (OAS)

- J2EE application server
- Does not play well with MS Application Server
  - No application server tech stacks interact well.
- Fusion will support other J2EE application servers.
- JDeveloper-to-OAS has single button deployment.
  - Deploying to other J2EE application servers is annoying.
- Your life will be MUCH easier with OAS.
  - Especially if doing custom deployment

Getting There: The Oracle Application Server

- Not such a big deal – can be avoided
  - Unless you are using MS Application Server
- Better integration than other application servers
- Lowest TCO
  - No finger pointing
  - Lower deployment costs



ADF BC

- Persistence interface for Fusion
- Oracle alternatives
  - TopLink
- Non-Oracle alternatives
  - Hibernate – open source
  - EJB
  - EJB3 – supported in JDeveloper
- Very high-quality
- Proprietary framework
- Very little penetration outside of Oracle

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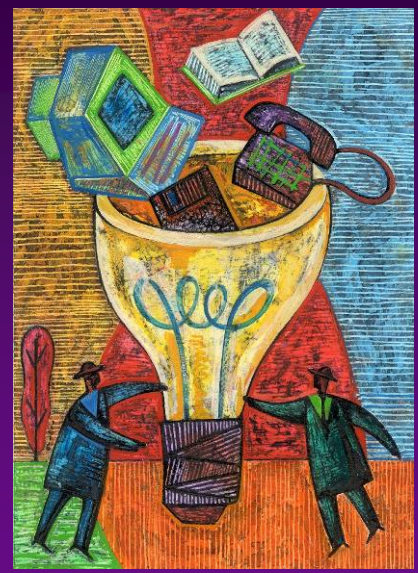
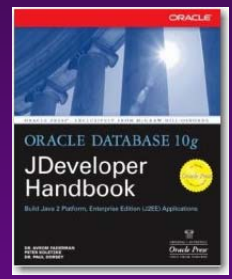
Why use ADF BC?

- Lower probability of project failure
- Very rich product
- Very mature
  - BC4J – V1 released in 2001
  - Rewritten several times
- Fusion will use it.
- Leading causes of J2EE project failure are hand-written persistence interfaces

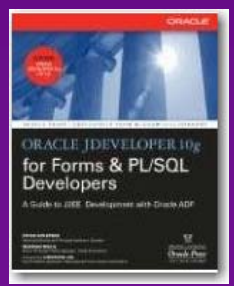


Getting There: ADF BC

- Start now
- High learning curve
- Easy to misuse
- *Oracle JDeveloper 10g Handbook*
  - (Roy-Faderman, Koletzke, Dorsey)



- *Oracle JDeveloper 10g for Forms & PL/SQL Developers*
  - (Koletzke, Mills)



BPEL
(Business Process Execution Language)

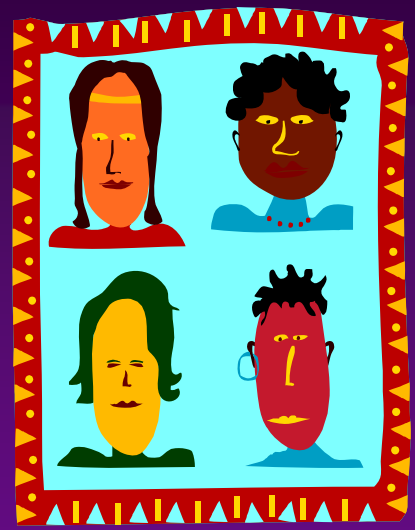
- Emerging standard
- Oracle implementation is very nice.
- Middle tier process flow language
- SOA inspired
  - Makes great sense for inter-system flows
  - Makes no sense for complex, local process flow

Getting There: BPEL

- Wait and see.
- How will Oracle really use this?
  - SOA: You may not even need it unless you are big.
  - Process Flow: You have some time.

ADF Faces

- Rich (sort of) user interface
- Standards-based
  - JavaServer Faces
  - Proprietary extension of Faces
- Next generation UIX
- Not really mature
  - Some quirks
  - Evolving fast
- Just another tag library
- Hard to extend
  - WYGIWYG (“What you get is what you get”)
- Still evolving



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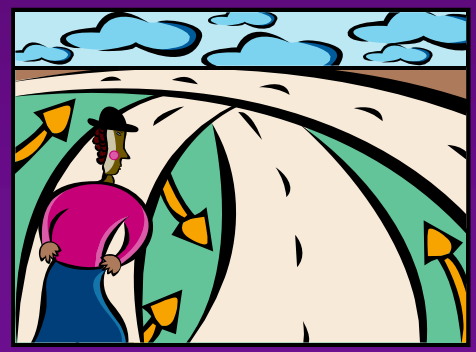
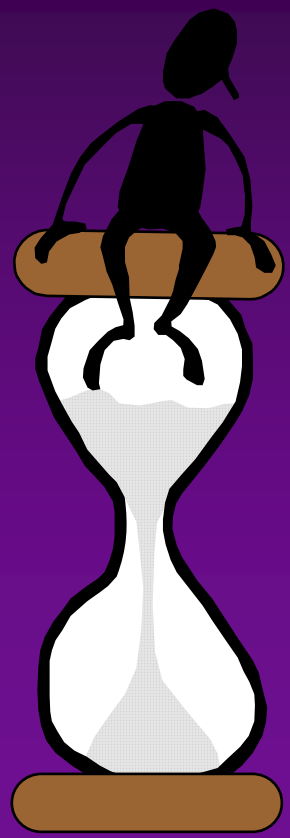
Getting There: Faces

- Start now
- Long learning curve
- Use with ADF
- Build a small project (or 3)



Getting There: Oracle Business Rules

- Wait and see.
- Not sure where this fits
- Focus resources elsewhere for now.



Non-Apps – Why should I care?

- Since I'm not an Oracle Applications customer, why should I care?
- This will be the best development platform on the planet.
  - Great Oracle integration
  - ADF BC is too good to ignore.
  - Fusion will be a force in the industry and dominant within the Oracle development community.

Fusion Middleware - Conclusions

- A great (or will be soon) development environment
- Still evolving - all parts are not totally civilized.
- Seems weak for architects (but I am biased)
- Too good and big to ignore
- Will be the standard for all Oracle Applications (eBusiness, PeopleSoft, JD Edwards)
- Still evolving, so use “thick database” approach

“Thick Database” Defined (1)

- Micro-Service-Oriented-Architecture (M-SOA) approach
- Division between the database and user interface (UI) portions.
- Two key features involved in "thick database thinking":
  - Nothing in the UI ever directly interacts with a database table. All interaction is accomplished through database views or APIs.
  - Nearly all application behavior (including screen navigation) is handled in the database.
- Thick database does not simply mean stuffing everything into the database and hoping for the best.

“Thick Database” defined (2)

- Creating a thick database makes your application UI technology-independent.
  - Creates reusable, UI technology-independent views and APIs.
  - Reduces the complexity of UI development.
  - Database provides needed objects.
  - Reduces the burden on the UI developer

Database vs. UI Technology Stack-Independence

Database

- Oracle will add features.
- DBMS will not internally refactor.
- Existing stack “works.”
- Huge DBA learning curve
- Huge cost of switching

UI Technology Stack

- Java EE or .Net?
  - AppEx
  - FLEX
- All environments change
  - Redesign assured
- Every year BRIM® has been rebuilt.

Benefit 1. Better Performance

- Improved overall throughput
- Caused by combined effect of:
  - Fewer roundtrips
  - Less network traffic
  - Better database access
- Test: Average improvement in performance?
  - a) 10%
  - b) 100%
  - c) 10x
  - d) 100x
  - e) 500x

Answer: c) 10x

Benefit 2. Fewer Round Trips

- Requires many fewer round trips from the application server to the database.
- Each screen should be 1-3 round trips
- Test: OO developers can write screens that require this many database round trips:
  - a) dozens
  - b) hundreds
  - c) thousands
  - d) millions

Answer: I have seen a, b and c.
The record was 6000 roundtrips.

Benefit 2. Less Code Required

- Less PL/SQL code is needed to perform data centric operations than Java.
- PL/SQL has more data tricks.
- Database-intensive code will always be more efficiently written in the database.
- Test: Average reduction in the amount of code needed is:
  - a) 10%
  - b) 25%
  - c) 50%
  - d) 90%

Answer: c) 50%

Benefit 3. Less Development Time Needed

- Less code means less coding time.
- Simpler architecture
  - Separate user interface and logic
  - Building two smaller applications is easier than building one large one.
- UI is trivial.
  - Can be shown to users right away.
  - Faster feedback to the development team
  - Helps to identify design errors much earlier in the process
- Test: Using a thick database approach can reduce development time by
  - a) 10%
  - b) 33%
  - c) 50%
  - d) 66%

Answer: d) 66%

Benefit 4. Easier to Maintain

- Application being built is divided into two parts
  - Each has less code to maintain.
- Application is clearly partitioned.
  - When a business rule changes, only need to look through half of the code to find it.
- As the number of lines of code in an application doubles, the complexity increases by a factor of four.

Benefit 5. Easier to Refactor

- UI technology stack changes are common.
- .Net Java EE battle rages on.
- Web architecture is more volatile than the database platform.

- Defense against the chaos of a rapidly evolving standard
- Test: What is the probability that your web UI standards will be the same in 18 months?

Answer 0%

Benefit 6. Better Use of Different Talent Levels

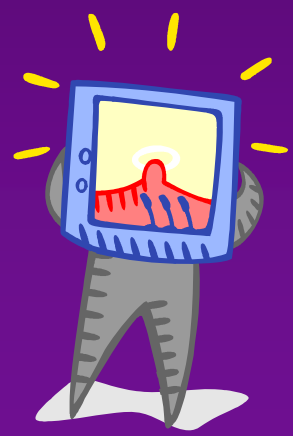
- With minimal additional training, skilled SQL and PL/SQL developers can help build web applications with no web skills whatsoever.
- If sophisticated UI developers are available, they can focus on delivering very high quality user interfaces.

Thick Database Development Process

- Two portions of an application can be coded independently
  - Teams can work in isolation until substantive portions are working.
- First version of the UI is built within a few days
  - Use as testing environment for the database team
  - Feedback can be received from users.
- Use Agile process
  - Minimal design work done to produce a partially working system.
  - Additional functionality created in an iterative design process.

User Interface Design

- Design the application.
  - Screens are designed on paper.
  - White boards are used for page flows.
  - Real screen mock-ups are usually a waste of time.
    - A careful diagram on a piece of paper suffices for the initial UI design.
    - MS Access is also good.

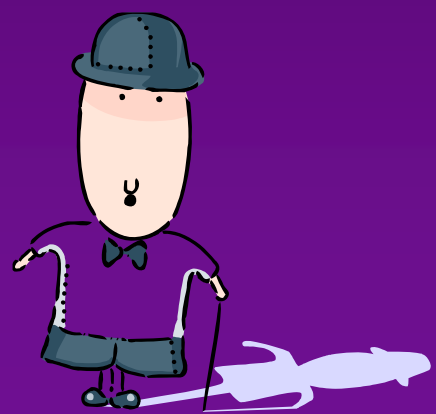


Interface Design

- Once the UI design is complete, determine:
  - What views are required
  - APIs that will be called

Interface Stubbing

- Stub out the code for the views and APIs.
  - `select <values> from dual`
  - APIs = functions that return a correct value (usually hard-coded).
- Interfaces will change as the application matures.



UI and Database Development

- UI and database development take place at the same time.
  - UI team takes the APIs and incorporates them into the application.
  - Database team makes them work.

Persistence in “Stateless Land”

- Server-side
  - Create a table and persist all global info
  - Persistent lock rows (lock_id column)
  - Pass session ID on each call
  - Worry about abandoned sessions
  - Best approach – but requires more work
- Middle tier
  - Can’t be done unless you are only using 1 application server
  - Usually persists to the database
- Client
  - Cookies
  - Pass context to database each time

Function-Based Views

- Functions can return object collections.
- An object collection can be cast to a table.
- Object collections types are supported in SQL.
- The idea:
  - Build a view over the function to hide complex procedural logic.

Underlying Types and Functions

```
type lov_oty is object (id, display_tx);
type lov_nt is table of lov_oty;

function f_getLov_nt
  (i_table_tx,i_id_tx,i_display_tx,i_order_tx)
return lov_nt is
  v_out_nt lov_nt := lov_nt();
begin
  execute immediate
     'select lov_oty('
        |i_id_tx||','||i_display_tx||')'||
    ' from '||i_table_tx||
    ' order by '||i_order_tx
   bulk collect into v_out_nt;
  return v_out_nt;
end;
```

Query the Function as a Table

- Generic value list query for any UI:
  - Uses bind variables – no significant performance impact
  - Completely dynamic – any new fields/tables/etc.

```
select id_nr, display_tx
from table(
            cast(f_getLov_nt
                    ('emp',
                     'empno',
                     'ename||''-''||job',
                     'ename')
            as lov_nt)
            )
```

Create a View

- Views placed on top of dynamic functions:
  - Completely hide the logic from the UI
  - INSTEAD-OF triggers make logic bi-directional.
  - Minor problem – There is still no way of passing parameters into the view other than by using some type of global.

```
Create or replace view v_generic_lov as
select id_nr, display_tx
from table( cast(f_getLov_nt
     (GV_pkg.f_getCurTable,
      GV_pkg.f_getPK(GV_pkg.f_getCurTable),
      GV_pkg.f_getDSP(GV_pkg.f_getCurTable),
      GV_pkg.f_getSORT(GV_pkg.f_getCurTable))
           as lov_nt)
          )
```

De-Normalized Views

- The idea:
  - Convert relational data into something that will make user interface development easier
- The solution:
  - Use a view with a set of INSTEAD-OF triggers

De-Normalized view

```
create or replace view v_customer
as
select c.cust_id,
       c.name_tx,
       a.addr_id,
       a.street_tx,
       a.state_cd,
       a.postal_cd
from customer c
left outer join address a
   on c.cust_id = a.cust_id
```

INSTEAD-OF Insert

```
create or replace trigger v_customer_ii
instead of insert on v_customer
declare
  v_cust_id customer.cust_id%rowtype;
begin
  if :new.name_tx is not null then
   insert into customer (cust_id,name_tx)
    values(object_seq.nextval,:new.name_tx)
   returning cust_id into v_cust_id;
  if :new.street_tx is not null then
   insert into address (addr_id,street_tx,
         state_cd, postal_cd, cust_id)
   values (object_seq.nextval,:new.street_tx,
    :new.state_cd,:new.postal_cd, v_cust_id);
  end if;
end;
```

A Tale of Two Systems

- 1. Internal Modification Request Tracker:
  - Built using conventional approach by an experienced Java team.
  - Earlier version built by offshore, inadequately skilled development team.
  - To create a working version of the system took about 6 months – flawed architecture
- 2. Complex order entry system
  - Built using the “thick database” approach by a team with equivalent experience.
  - Thick database approach was used from the start
    - All navigation supported using a tree on the left hand side of the screen.
    - Tree itself is built into the database.
    - All navigation logic is handled in the database.

Case Study: 2 Similar Systems - Results

	Database code # of lines	Java code # of lines	StrutsConfig .xml # of lines	Database development time	Java develop-ment time
Conventional development	2300	13000	657	2 weeks	6 months
Thick database development	3900	2800	98	2 weeks	1 week

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Summary

- Oracle Fusion will be based on e-Business.
  - Everyone else migrates.
- Must use:
  - Oracle DBMS, J2EE stack
- Should use:
  - OAS, ADF
- Avoid for now:
  - BPEL, Oracle Business Rules

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Conclusions

- Moving code from the middle tier to the database had the following benefits:
  - Reduced the total amount of code
  - Reduced development time
  - Improved performance
  - Reduced network traffic
  - Reduced the complexity of the application
- Thick database approach is a viable alternative to the conventional wisdom of reducing reliance on the database.
  - Leverages existing database talent
  - Can result in dramatic improvements in performance

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Contact Information

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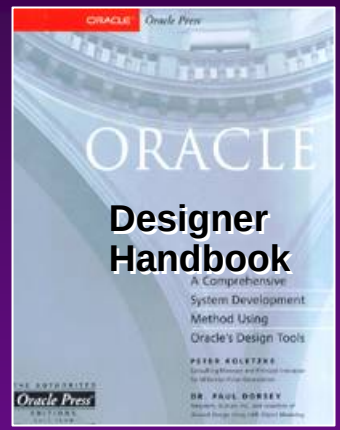

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