DMSTEX Business Solutions

DDGS Presentation 5

Generated History/Audit

Sponsored by DMSTEX Business Solutions

- Founded 2010
- 25 Years Oracle Experience
- Database Design and Generation Service
  - Oracle Database Schema
  - PL/SQL Application Programming Interfaces
  - Application Specific Test Data
  - APEX Data Maintenance Forms

Database Design and Generation Service (DDGS) Presentations

A Series of 5 Presentations

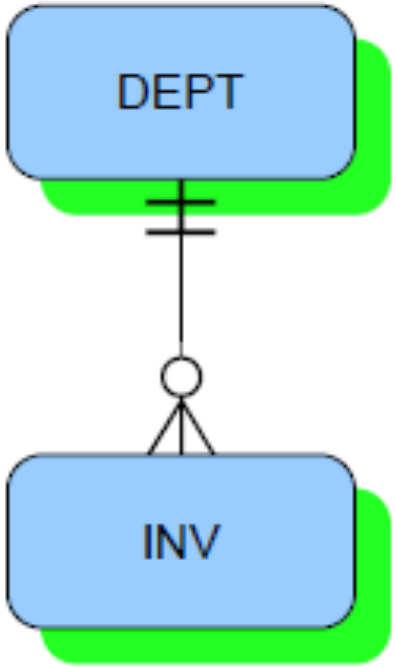
1. DDGS Deliverables
2. DDGS Generated API
3. DDGS Generated Data Handling
4. DDGS Generated Subtypes
5. **DDGS Generated History and Audit**

Presentations do not cover all functionality

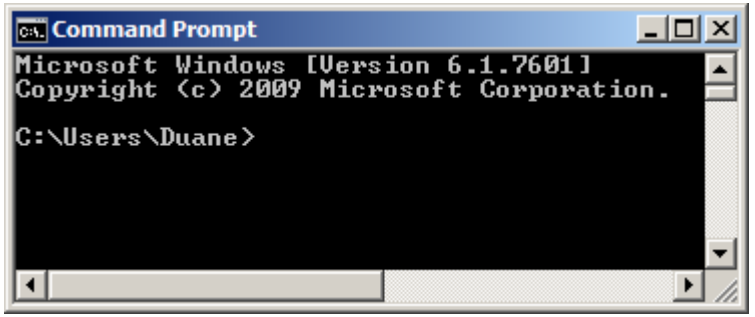
5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
- Effective (Valid Time)
- DML UNDO on Primary Key
- Temporal Database Views

Documentation
E-R Diagram



Setup



- Text Editor
- Command Prompt
- Oracle Database 11g
- P5 Deliverables
- Web Browser
- Adobe Reader

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
  - Definition
  - Implementation Objectives
  - Column Definitions
- Audit Log (Transaction Time)
- Effective (Valid Time)
- DML UNDO on Primary Key
- Temporal Database Views

Temporal Database Introduction Definition

As of December 2011, ISO/IEC 9075, Database Language SQL:2011 Part 2: SQL/Foundation included clauses in table definitions to define "application-time period tables" (valid time tables), "system-versioned tables" (transaction time tables) and "system-versioned application-time period tables" (bitemporal tables).

http://en.wikipedia.org/wiki/Temporal_database

Temporal Database Introduction
Implementation Objectives

- DDGS Temporal Solution
  - Runs Native Oracle 11g SQL
  - All Oracle 11g Database Editions
  - No Requirement for SDO

- Simple Operational Modes
  - Transaction Time (LOG)
  - Bi-Temporal (EFF)

Temporal Database Introduction Column Definitions

- Audit Log Date/Time - EFF & LOG Mode
  - AUD_BEG_DTM - Starting Transaction Date/Time
  - AUD_END_DTM - Ending Transaction Date/Time

- Audit Log User - EFF & LOG Mode
  - AUD_BEG_USR - Starting Transaction User
  - AUD_END_USR - Ending Transaction User

- Effective Date/Time - EFF Mode
  - EFF_BEG_DTM - Starting Valid Date/Time
  - EFF_END_DTM - Ending Valid Date/Time

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
  - UTIL.SET_USR
  - INV_ACT View
  - Insert DML
  - Update DML
- Effective (Valid Time)
- DML UNDO on Primary Key
- Temporal Database Views

Audit Log
UTIL.SET_USR

- Required for Temporal DB DML
- No Authentication
- No Authorization

Audit Log
INV_ACT View

COLUMN_NAME	COMMENTS
ID	Surrogate Primary Key for these inv
AUD_BEG_USR	User that created this record
AUD_BEG_DTM	Date/Time this record was created (must be in nanoseconds)
DEPT_ID	Surrogate Key of Inventory Department
DEPT_NK1	DEPT Natural Key 1: Name of the Department
INAME	Item Name
ONHAND	On Hand Quantity

Audit Log
Insert DML

```
SQL> execute util.set_usr('Demo 1');
PL/SQL procedure successfully completed.
SQL> insert into inv_act (dept_nk1, iname, onhand)
  2   values ('RESEARCH', 'TABLETS', 125);
1 row created.

SQL> select id, aud_beg_usr, aud_beg_dtm, iname, onhand
  2   from inv_act where dept_nk1 = 'RESEARCH';
 ID AUD_BEG_USR  AUD_BEG_DTM       INAME    onhd
--- ------------ ----------------- -------- ----
  4 Demo 1       10/15/13 21:46:19 TABLETS   125
```

Audit Log
Update DML

```
SQL> execute util.set_usr('Demo 2');
PL/SQL procedure successfully completed.
SQL> update inv_act set aud_beg_usr = 'BOGUS', onhand = 100,
  2   aud_beg_dtm = sysdate-1 where dept_nk1 = 'RESEARCH';
1 row updated.

SQL> select id, aud_beg_usr, aud_beg_dtm, iname, onhand
  2   from inv_act where dept_nk1 = 'RESEARCH';
 ID AUD_BEG_USR  AUD_BEG_DTM       INAME    onhd
--- ------------ ----------------- -------- ----
  4 Demo 2       10/15/13 21:46:55 TABLETS   100
```

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
- Effective (Valid Time)
  - DEPT Table
  - Insert DML
  - Update DML
- DML UNDO on Primary Key
- Temporal Database Views

Effectivity
DEPT Table

COLUMN_NAME	COMMENTS
ID	Surrogate Primary Key for these dept
EFF_BEG_DTM	Date/Time this record became effective
AUD_BEG_USR	User that created this record
AUD_BEG_DTM	Date/Time this record was created (must be in nanoseconds)
DNAME	Name of the Department
LOC	Location of the Department

Effectivity
Insert DML

```
SQL> execute util.set_usr('Demo 3');
PL/SQL procedure successfully completed.
SQL> insert into dept (eff_beg_dtm, dname, loc)
  2   values (sysdate-90, 'SHIPPING', 'PHOENIX');
1 row created.

SQL> select id, eff_beg_dtm, aud_beg_usr, aud_beg_dtm,
  2   dname, loc from dept where dname = 'SHIPPING';
 ID EFF_BEG_D AUD_BEG_USR  AUD_BEG_D DNAME      LOC
--- --------- ----------- --------- ---------- --------
  5 07/17/13  Demo 3       10/15/13  SHIPPING   PHOENIX
    21:48:57               21:48:57
```

Effectivity
Update DML

```
SQL> execute util.set_usr('Demo 4');
PL/SQL procedure successfully completed.
SQL> update dept set loc='DENVER' where dname='SHIPPING';
1 row updated.

SQL> select id, eff_beg_dtm, aud_beg_usr, aud_beg_dtm,
  2   dname, loc from dept where dname = 'SHIPPING';
 ID EFF_BEG_D AUD_BEG_USR  AUD_BEG_D DNAME      LOC
--- --------- ------------ --------- ---------- --------
  5 10/15/13  Demo 4       10/15/13  SHIPPING   DENVER
    21:50:16               21:50:16
```

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
- Effective (Valid Time)
- DML UNDO on Primary Key
  - Overview
  - Example
- Temporal Database Views

DML UNDO on Primary Key Overview

- Only available on Temporal DB tables
- Independent of DML Commit Sequence
- Temporal Continuity Enforced
- Always Audited

DML UNDO on Primary Key Example

```
SQL> execute util.set_usr('Demo 5');
PL/SQL procedure successfully completed.
SQL> execute dept_dml.pop(dept_dml.get_id('SHIPPING'));
PL/SQL procedure successfully completed.

SQL> select id, eff_beg_dtm, aud_beg_usr, aud_beg_dtm,
  2   dname, loc from dept where dname = 'SHIPPING';
 ID EFF_BEG_D AUD_BEG_USR  AUD_BEG_D DNAME      LOC
--- --------- ----------- --------- ---------- --------
  5 07/17/13  Demo 3       10/15/13  SHIPPING   PHOENIX
    21:48:57               21:48:57
```

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
- Effective (Valid Time)
- DML UNDO on Primary Key
- Temporal Database Views
  - Overview
  - ALL View
  - OMNI View
  - ASOF View

Temporal Database Views Overview

- _ALL View
  - Last version of Primary Key Record
  - Active, Deleted, or Undo Insert
- _OMNI View
  - All versions of all records
  - Active, History/Audit, Undo Log
- _ASOF View
  - Valid Time Point-in-Time Query
  - LOG - Transactional Time (AUD_BEG_DTM)
  - EFF - Valid Time (EFF_BEG_DTM)

Temporal Database Views
ALL View

```
SQL> select id, stat, iname, onhand, aud_beg_dtm,
  2   aud_end_dtm, aud_beg_usr, aud_end_usr
  3   from inv_all order by aud_beg_dtm;
 ID STA INAME    onhd AUD_BEG_D AUD_END_D AUD_BEG_ AUD_END_
--- --- -------- ---- --------- --------- -------- --------
  1 ACT BROCHURE  513 10/15/13             P5 Load
        S             21:45:45             Insert
  2 LOG COFFEE C   22 10/15/13  10/15/13  P5 Load  P5 Load
        UPS           21:45:45  21:45:46  Insert   Update
  3 POP POSTERS     4 10/15/13  10/15/13  P5 Load  P5 Load
                      21:45:45  21:45:46  Insert   Update
  4 ACT TABLETS   100 10/15/13            Demo 2
                      21:46:55
```

Temporal Database Views

OMNI View

```
SQL> execute util.set_usr('Demo 6');
SQL> update dept set eff_beg_dtm = (sysdate - 1),
  2   loc = 'SEATTLE' where dname = 'SHIPPING';

SQL> select dept_id id, stat, aud_beg_dtm, aud_end_dtm,
  2   aud_beg_usr, aud_end_usr, loc from dept_omni
  3   where dname = 'SHIPPING' order by aud_beg_dtm;
 ID STA AUD_BEG_D AUD_END_D AUD_BEG_ AUD_END_ LOC
--- --- --------- --------- -------- -------- --------
  5 EFF 10/15/13  10/15/13  Demo 3   Demo 6   PHOENIX
        21:48:57  21:53:48
  5 POP 10/15/13  10/15/13  Demo 4   Demo 5   DENVER
        21:50:16  21:51:13
  5 ACT 10/15/13            Demo 6             SEATTLE
        21:53:48
```

Temporal Database Views
ASOF View

```
SQL> select to_char(sysdate,'MM/DD/YY HH24:MI:SS') from
dual;
10/15/13 21:55:20

SQL> execute util.set_asof_dtm(sysdate-2);
PL/SQL procedure successfully completed.

SQL> select id, eff_beg_dtm, eff_end_dtm,
  2   aud_beg_dtm, aud_end_dtm, loc from dept_asof
  3   where dname = 'SHIPPING' order by aud_beg_dtm;
 ID EFF_BEG_D EFF_END_D AUD_BEG_D AUD_END_D LOC
--- --------- --------- --------- --------- --------
  5 07/17/13  10/14/13  10/15/13  10/15/13  PHOENIX
    21:48:57  21:53:48  21:48:57  21:53:48
```

5. DDGS Generated History/Audit

- Documentation and Setup
- Temporal Database Introduction
- Audit Log (Transaction Time)
- Effective (Valid Time)
- DML Undo on Primary Key
- Temporal Database Views

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