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- Introductions**
- **Instructor**
    - SunGard Higher Education Title
    - Background and experience
  - **Registered Guests**
    - Name
    - Organization
    - Title/Function/Responsibilities
    - Banner Experience
    - Expectations

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- Objectives**
- Know what Oracle products you have installed and how to manage them
  - Understand how Internet Native Banner (INB) and Self Service Banner (SSB) work with the primary components of Oracle
  - Locate Banner and Oracle source code
  - Understand the basics of Banner
  - Apply a Banner upgrade
  - Apply Banner security to users and site-created source code
  - Have working knowledge of Banner Job Submission

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**Agenda**

- Oracle
  - RDBMS, Forms, Reports and Web services
- Banner
- Banner Upgrades
- Banner Security
- Banner Job Submission

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BANNER HIGHER EDUCATION

**Oracle Components**

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**Oracle Overview**

- Oracle has many software products for information services customers
- With Banner, we are concerned with the following four Oracle products:
  - RDBMS Server
  - Forms and Reports
  - The Internet Application Server
  - Oracle Jinitiator (or Sun JVM)

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### Oracle Overview

- The RDBMS software manages the databases
- The Oracle Forms and Reports products are the business intelligence/presentation layer for the Banner application
- The Oracle 10g Application Server software provides an internet based solution that portals Self Service Banner and 'web enables' the Forms and Reports product to present the Banner application over the web
- Jinitiator is the java applet that runs inside the client's web browser

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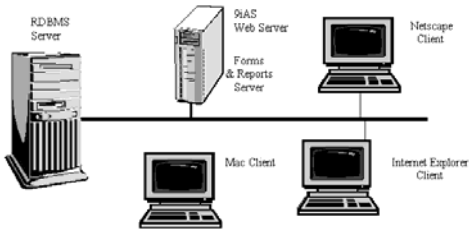
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### Internet Native Banner - INB



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### INB – Oracle components

- Oracle RDBMS
  - 9i Enterprise Edition (up to Banner 7)
  - 10g Enterprise Edition (Banner 7.2 +)
- Oracle AS10g Release 1 (9.0.4.x) or Release 2 (10.1.2.x)
  - Forms & Reports Services
  - HTTP Server
  - PL/SQL Database Access Descriptor (DAD)
  - Oracle Components for Java (OC4J)
  - Oracle Jinitiator or Sun JVM (on client)

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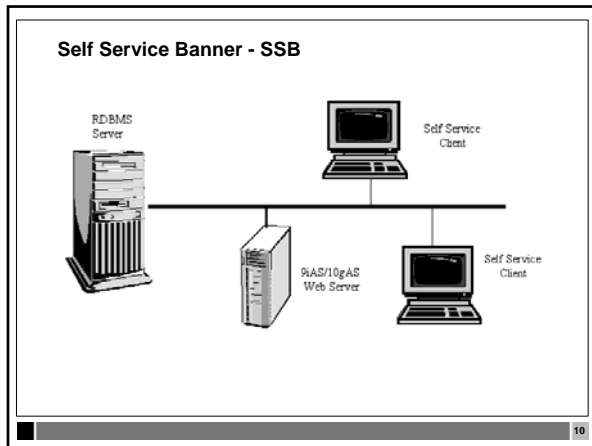
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- ### SSB – Oracle Components
- Oracle RDBMS
    - 9i Enterprise Edition (up to Banner 7)
    - 10g Enterprise Edition (Banner 7.2 +)
  - Oracle AS10g Release 1 (9.0.4.x) or Release 2 (10.1.2.x)
    - HTTP Server
    - PL/SQL Database Access Descriptor (DAD)
    - J2EE and Web Cache only needed for install
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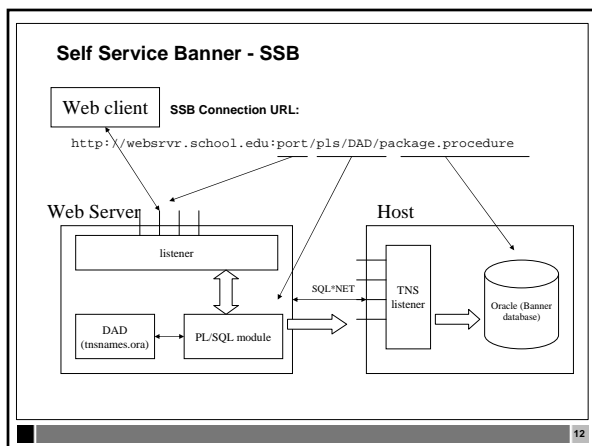
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**Exercise 1**

- Where is your web server's documentation?
- How do you access it?
- What other documentation do you have for Web Applications?
- What other resources are there?

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**Oracle software and directory structures**

- **For the database server**
  - RDBMS, OCI, Pro\*COBOL, Pro\*C, Oracle Net Services, Oracle Enterprise Manager
- **For the application servers**
  - SSB - Oracle AS10g Release 1 (9.0.4.x) or Release 2 (10.1.2.x)
  - INB - Oracle AS10g Release 1 (9.0.4.x) or Release 2 (10.1.2.x), Forms and Reports
- **For the client**
  - HTML Compliant Web Browser with JavaScript support
  - INB Only - Java Virtual Machine (Sun JVM or Oracle JInitiator)
- **SunGard Higher Education's directory structure standard for placement of Oracle and Banner software follows the Oracle recommended OFA standard across the RDBMS, INB and SSB servers**

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**The OFA Standard - Docs**

- **A directory structure developed by Cary V. Millsap**
- **The Optimal Flexible Architecture**
  - A careful naming strategy to eliminate data administration problems
  - Allows for multiple versions of Oracle by providing multiple ORACLE\_HOME directories
  - The original OFA recommendations are published in *The OFA Standard: Oracle 8 for Open Systems*
  - The OFA document for UNIX can be found in appendix A of the Administrator's Guide

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### The OFA Standard – Issues

- The OFA standard came about as a solution model for the following issues:
  - Performance bottlenecks caused by poor organization
  - Vulnerability to data corruption
  - Adequate management and administration of database growth
  - Application failures due to segment growth and fragmentation
  - Alleviation of switching among multiple Oracle databases

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### The OFA Standard – ORACLE\_BASE

- It is UNIX-based, but the idea is universal
  - A mount point *pm*
  - A standard directory name *h*
  - The name of the owner of the product *u*

*/pm/h/u*

- Example: */u01/app/oracle* is the Oracle software owner home and is referred to as the ORACLE\_BASE environment variable (used by Oracle Universal Installer)

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### The OFA Standard – ORACLE\_HOME

- To fulfill the OFA structure of multiple Oracle homes
  - A standard directory name *h*
  - The version of the software *v*

*/pm/h/u/h/v*

- Example: */u01/app/oracle/product/10.2.0* indicates the start for Oracle 10g, and is referred to as the ORACLE\_HOME environment variable

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### The OFA Standard – Multiple homes

- **ORACLE\_BASE** serves as a pointer to a root directory for the OUI to start in, while **ORACLE\_HOME** is used to define each co-existing Oracle product version
- The different tiers of Oracle products each have associated **ORACLE\_HOMES** defined. They have not yet learned to play nicely together on the same machine
- Some versions of the same software cannot be installed in the same OFA tree
- **Older versions of Oracle were not easily 'multi-homed'**
  - Forms and Reports 4.0 through 6i

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### The OFA Standard and Banner

- The placement of the Banner system is structured to follow OFA on the application servers.
- Typically it is:
  - /u01/app/sghe/inb...
  - /u01/app/sghe/ssb...

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### OFA – Exercise 2

- **What is your ORACLE\_BASE?**
- **What is your ORACLE\_HOME?**
  - Database server?
  - Internet Native BANNER application server?
  - Self Service BANNER application server?
- **Do you have multiple Oracle versions?**
  - If so, how do you separate the versions?
  - RDBMS and/or OAS?

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### The Oracle Installers

- Oracle has its own installer programs
  - Oracle Universal Installer (OUI)
- There may be different ones for each tier, driven by the version of the Oracle software
  - For the RDBMS server
  - For the Application Server
  - For the Client

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### RDBMS - Tools

- Administrative Tools
  - SQLPLUS
  - Oracle Enterprise Manager (OEM)
  - SQL Developer
  - TOAD
  - Patrol
- Administrative Utilities
  - SQL\*Loader
  - Import/Export

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### SQL\*Plus

- SQL\*Plus has been the interactive tool for accessing Oracle databases
- SQL\*Plus enables you to manipulate SQL commands and PL/SQL blocks, and to perform many additional tasks as well
- Make sure that the environment variables are set to point to the proper instance
- The only tool to create a database

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### SQL\*Plus uses

- Through SQL\*Plus, you can
  - enter, edit, store, retrieve, and run SQL commands and PL/SQL blocks
  - format, perform calculations on, store, and print query results in the form of reports
  - list column definitions for any table
  - access and copy data between SQL databases
  - send messages to and accept responses from an end user
  - perform database administration.

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### SQLPLUS

- **sqlplus /nolog**
  - Starts the application
  - Can be used to log in as a privileged user with a password file
- **sqlplus "/ as sysdba"**
  - Uses a privileged set of commands that allow actions such as shutdown and startup
  - Allows the user of the DBA group to bypass the sys password

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### SQL\*Plus Startup/Shutdown

- **Command-line control of starting and stopping the database instance**
- **Startup**
  - sqlplus /nolog (sqlplus "/ as sysdba")
  - connect sys/syspass as sysdba
  - startup
- **Shutdown**
  - sqlplus /nolog (sqlplus "/ as sysdba")
  - connect sys/syspass as sysdba
  - shutdown normal/immediate/abort/transactional

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### RDBMS - OS Startup/Shutdown

- Startup and shutdown can be managed from an OS level utility, such as crontab, oradim, OUI and OEM
- OS startup and shutdown is through the /sbin/init.d structure (UNIX), service (NT) or systartup.com (OpenVMS)
- Should be coordinated with the startup and shutdown of web services
- Oracle supplies a dbstart and dbshut utility for Unix

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### Oracle Enterprise Manager

- Oracle Enterprise Manager is a product that Oracle has been developing for a long time
- The Enterprise Manager console is a comprehensive tool for database management, configuration and tuning
- This product allows DBAs to manage the Oracle system locally and remotely

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### OEM Documents

- **Oracle Enterprise Manager**
  - Oracle Enterprise Manager Administrator's Guide
  - Oracle Enterprise Manager Concepts Guide
  - Oracle Enterprise Manager Configuration Guide
  - Oracle Enterprise Manager Messages Manual
  - Oracle Intelligent Agent User's Guide
  - Oracle SNMP Support Reference Guide

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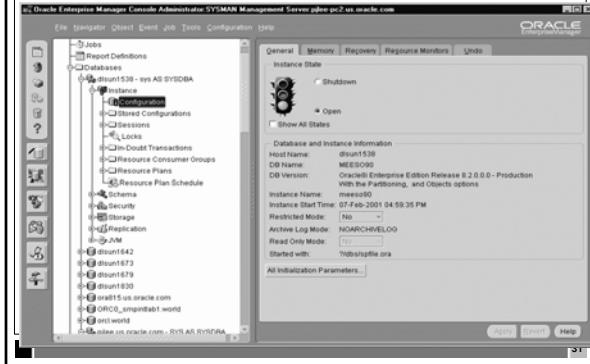
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## OEM – Instance Manager



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## TOAD

A product that can provide many of the features of OEM



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## Oracle DBA Utilities

- **SQL Loader**
  - Used to import flat files into Oracle objects
- **Import**
  - Oracle's binary dump file of one to many objects
- **Export**
  - Oracle's binary dump file

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**SQL\*Loader**

- SQL\*Loader is the Oracle tool that is used to load flat files into Oracle tables
- Has a powerful data parsing engine which puts little limitation on the format of the data in the data file
- Can load data from multiple data files during the same load session
- Can load data into multiple tables during the same load session

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**Import/Export**

- Import and Export are a complimentary set of Oracle utilities that are used to import and export data from Oracle databases.
- These are conducted while the database is up.
- Import is used to take a previously exported dump file and insert the exported data and/or structure into an Oracle database.
- Exports can be part of your backup strategy.
- A full export can be used for recovery purposes.

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**Import/Export, continued...**

- Exports can be created with the data from just one table, many tables or the entire database, and may (or not) include indexes and permissions.
- Just the database structure can be exported without data.
- Caution should be taken with some options such as *rows*, *tables*, *analyze*, *consistent* and *commit*.
- See the Oracle Utilities Manual for valuable case studies and available options

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**RDBMS - Network**

- **SQL\*Net**
  - SQL\*Net was the original proprietary networking protocol supplied with Oracle
  - Handled the communication between the RDBMS and Oracle client applications
- **Oracle Net Services**
  - The new version of SQL\*Net that comes with Oracle 9i and 10G

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**Oracle Net Services**

- Client to server
- Server to server
- Routing through a *connection descriptor*
- *Listeners* handle the connection requests
- Configuration can be done through a GUI tool (Configuration Assistant)
- Now supports LDAP
  - Oracle Internet Directory (OID)

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**Oracle Net descriptor**

- **Connection descriptor**
  - Network route by *protocol address*
  - Service name defines the requested service usually a *global database name*
  - A *connect string* is built from the above information and passed on the network to the appropriate listener

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**Descriptor example**

- **Local naming example**

```
CONNECT
scott/tiger@((description=(address=(protocol=tcp)

(host=myserver)

(port=1521))

(connect_data=(service_name=seed.uco.edu)))
```

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**End of Section**

***Any Questions?***

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**The Banner Pieces**

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**Banner Overview**

- Banner is a mature product
- Original versions built in the late 1980s
- Written to integrate Student, HR, Alumni, Financial Aid, and Finance information
- Has had a lot of functionality added to it over the years
- It is a BIG application now

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**Installed Banner**

- Documentation set
- Banner basics
- Software
- Directory structures
- Environment variables

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**Banner files**

- **Location of other Banner files and their uses**
  - On the RDBMS server
  - On the Client
  - On the Application server (Internet Native Banner)
  - On the Web server (Self Service)

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**Banner Documentation set**

- Banner features a documentation set in PDF format
- Install Guides
- Release Guides
- Upgrade Guides
  - Supporting documents
- A set of User Reference Manuals
- A set of Technical Reference Manuals

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**Banner Documentation installation**

- Downloaded from Customer Support Center web site
- File shared to end users
- Directory is `bdoc8x`
  - `setup8x`
    - Server Install Guide
    - Client Install Guide
    - Bookshelf Install Guide

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**Banner Documentation manuals**

- `bdoc8x` directory
  - Product manual directories
    - `finance8x`, `advanc8x`, `student8x`, etc.
  - Index directory
    - `_index8x`
  - Technical reference directory
    - `General8x`, `advanc8x`, `arsys8x`, `finaid8x`, `finance8x`, `humres8x`, `student8x`
  - `bkshlf8x.pdf`
    - Startup page for the Banner Bookshelf
  - Security
    - `General/security800000trm.pdf` must be downloaded from the patch site. It does not come with the complete download
    - This manual does not appear in the index, so the casual user will not find it.

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### Banner User Manuals

- **User Reference Manuals**
  - Available online to all Banner users
  - Uses clients' Adobe Acrobat Reader
- **User Release Guides**
  - Each upgrade contains one with the changes for the current release
- **Should be stored on/accessed from a shared file server**
- **Initially installed on INB server for quick access by all users**
  - Do not support all Acrobat functionality

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### Banner Technical Manuals

- **Technical Reference Manuals**
  - Available online to all Banner users
  - Contains the database schematics
    - Additional documents can be found in Extended Search on the UDC (i.e. ERDs)
  - Great source of reference for
    - Security – GSASECR
    - Job Submission
    - Site-specific change management
    - Process flows

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### Upgrades

- **Includes a set of change documents and source files.**
  - Upgrade Guide is the step by step guide to upgrading releases
  - User Release guides
  - Change documents – very valuable for deleted and/or changed data types
    - baninst1\_70100to70200.pdf
    - PRODUCT\_70100to70200.pdf
    - PRODUCT\_objects70100.pdf

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**Exercise 1**

- What Banner products did you purchase?
- What Banner products are installed?
- Who has access to the Banner manuals?
- Which manual discusses distributed Banner security?

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**Banner Basics –  
Naming Conventions**

- **Software**
  - Product modules
  - Product directories
  - Software Objects
    - Pro\*C source code
    - Pro\*COBOL source code
    - Forms binaries (FMB)
    - Reports binaries (RDF)
    - Database object source code

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**Banner Basics - Products**

- **Software**
  - Product modules

Admin	Finaid	Payweb
Common	BANINAS	Aluweb
General	VR-Student	Wtlweb
Student	VR-Epos	Infoacc
Arsys	VRBrite	Intcomp
Alumni	Genweb	
Finance	Stuweb	
Payroll	Scmweb	
Posnctl	Facweb	

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**Banner Basics – Product directories**

- **Software**
  - Product directories are named after the product
  - Each of these directories has a common set of subdirectories
    - c
    - cob
    - forms
    - dbprocs
    - views
    - plus
    - misc
    - install

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**Banner Basics – Compiler conventions**

- **Software**
  - There are different naming conventions for each type of software objects within these directories
    - Pro\*C
      - \*.pc - Pro\*C source file
      - \*.h - C header file
      - \*.c - C source file
    - Pro\*COBOL
      - \*.pco - Pro\*COBOL source file
      - \*.cob - Pro\*COBOL copylibs

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**Banner Basics – Forms conventions**

- **Software**
  - There are different naming conventions for each type of software objects within these directories
    - Forms
      - \*.fmb - Forms binary source file
      - \*.mmb - Menu binary source file
      - \*.pll - Procedure Library
      - \*.rdf - Reports binary source file

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**Banner Basics – SQL conventions**

- **Software**
  - There are different naming conventions for each type of software objects within these directories
    - dbprocs
      - xxKxxxx.sql - package source code
      - xxPxxxx.sql - procedure source code
      - xxFxxxx.sql - function source code
      - xxTxxxx0.sql - trigger source code
    - views
      - xxVxxxx0.sql - view creation
    - plus - xxxxxxx.sql

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**Banner Basics – Self Service products**

- **Software**
  - There is a difference in the naming conventions used for the Self Service products
  - dbprocs
    - TWGKxxxx.sql - Web Tailor Global package source code
    - BWAKxxxx.sql - Advancement Self Service package source code
    - BWCKxxxx.sql – Common Self Service package
    - BWFKxxxx.sql – Finance Self Service package source code
    - BWGKxxxx.sql – General Self Service package source code
    - BWLKxxxx.sql – Faculty Self Service package
    - BWPKxxxx.sql - Employee Self Service package source code
    - BWRKxxxx.sql - Finaid Self Service package source code
    - BWSKxxxx.sql - Student Self Service package source code

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**Banner Basics – Web products**

- **Software (continued)**
  - Misc (only UNIX or Windows)
    - Compile scripts for Pro\*C, Pro\*COBOL, Forms and Reports
    - Shell scripts for executables
    - Perl scripts for NT
  - Com (only OpenVMS)
    - Compile scripts for Pro\*C, Pro\*COBOL, Forms and Reports
    - DCL command procedures for executables

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### Banner Basics - Objects

- Database

- Product owners
- Product codes
- Important users
- Database Objects
  - Tables
  - Views
  - Packages (procedures and functions)
  - Triggers

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### Banner Basics – Product owners

- Product Owners and Codes

• General	GENERAL	G
• Student	SATURN	S
• Finance	FIMSMGR	F
• AR	TAISMGR	T
• Position Control	POSNCTL	N
• Payroll	PAYROLL	P
• FinAid	FAISMGR	R
• Advancement	ALUMNI	A
• Self Service	WTAILORE	TW

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### Banner Basics - Example

- Database objects (Tables and views)

— Example:

G	L	R	V	R	B	L
1	2	3	4	5	6	7

- 1 - Primary Module (S- Student, G- General, F- Finance)
  - 2 - Sub-module (L- Letter generation, G- General Person)
  - 3 - Type of object (R- Report, A- Form, R- Repeating table)
  - 4-7 - Meaningful name
- IF Pos 2 is a T and Pos 3 is a V, then the object is a validation table

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**Banner Basics - Triggers**

- **Triggers**
  - aT\_abcddd\_XXXXXXXXXXXXXXXXXXXX (total no more than 29 chars)
  - a = Product identifier, i.e. (S) Student, (P) Payroll
  - T = Trigger
  - abcddd = Table name
  - xxxxx = Meaningful trigger name

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**Banner Basics - Procedures**

- **Database**
  - Procedures and Functions
    - P\_XXXXXXXXXXXXXXXXXXXX (total no more than 29 chars)
    - F\_XXXXXXXXXXXXXXXXXXXX (total no more than 29 chars)
    - xxxxx = Meaningful name (up to 27 characters)
  - Cursors
    - XXXXXXXXXXXXXXXXXXXXXXXXXXXX\_C

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**Banner Basics – Referential Integrity**

- **Referential integrity**
  - Parent/Child relationships are enforced at the database level
  - No child data without a referenced parent key
  - No deletion of parent key while child records exist

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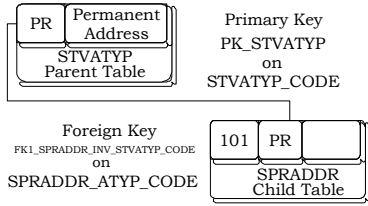
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**Banner Basics – RI example**



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**Exercise 2**

- What do you know about the column SPRADDR\_ATYP\_CODE?
- The package for Admissions Checklist Processing was accidentally dropped. How would you restore it?
- Which product does BWSKANAM belong to?
- Do all of the products contain gifs and icons?

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**Banner New Install**

- When a system is first installed or a new version is released, it is installed from CD-ROM
- The CD-ROM contains all the necessary software and an Adobe Install guide which specifies
  - System requirements
  - Space allocation
  - Directory structure
  - Environment requirements
- C and COBOL must be installed prior to installing Banner, along with an empty database

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**New Install – First Database**

- A database must be created before you can begin
- The database must have these tablespaces:
  - System (suggested at least 500MB)
  - Temp (suggested 100MB)
  - UNDO (Default if using DBCA, if not, 200MB)
  - Tools (suggested 25 MB)
  - Users (suggested 20 MB)
  - Development (suggested at least 500MB, autoextend, locally managed, uniform extent 64KB)
  - At least three redo groups

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**Banner Installation – Encryption KEY**

- CD-ROM of the Banner software contains the database contents and supporting code for the initial install
- All software on the CD-ROM is encrypted
- Encryption Keys are on a sheet of paper shipped with the order. DO NOT LOSE THIS!
- Software is decrypted and downloaded onto RDBMS server
- This decryption key is not the same as the site specific (explained later in Upgrading Banner)

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**Banner Installation - Environment**

- BANNER\_ROOT is the variable to list the top level of all Banner software on the server
- BANNER\_HOME is a variable used to define the location of a Banner software tree
- Used by Banner software as a base alias to find other Banner software

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**Banner Installation**

- There is an installer (*baninst*) for the Banner product on the RDBMS machine
- Implemented differently on each platform
- Modeled off of the old Oracle character mode installer
- Menu interface uses Perl for Windows, shell scripts on UNIX and DCL for OpenVMS

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**Banner Installation - Process**

- The Banner database software is installed on the RDBMS server in several steps:
  - Download Software
  - Create Banner Environment
  - Create Banner Instance
  - Create Banner Database Objects
  - Compile Pro\*C and Pro\*COBOL

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**Banner Installation – Step 1**

- The first step is to download the software to the RDBMS server
- There are four basic steps of downloading and preparing to install Banner:
  - Identify Products to download
  - Define Global Variables
  - Download the software
  - Build the environment control scripts

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**Banner Installation – Identify products**

- Identify Products to download (banpswd.sh)
  - First, two C programs (cryptfile.c and inipassr.c) must be compiled to use in decrypting the Banner products
  - Once these are done, the install script will ask for a decrypt password
  - This will then build a menu with the appropriate products marked for downloading

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**Banner Installation – Global definitions**

- Define Global Variables (banprmp.sh)
  - BANNER\_HOME
  - EXE\_HOME
  - ORACLE\_HOME
  - ORACLE\_SID
  - C
  - COBOL

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**Exercise 3**

- What must be installed before you can start an Banner install?
- Do you still have your original install directory?
- What is a decryption key used for?
- What is the name of the Banner installer?

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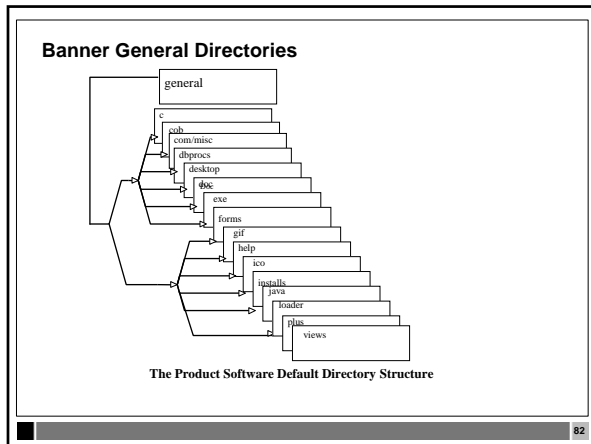
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- ### Banner Product Directories
- **C** directory contains the Pro\*C source
  - **COB** directory contains the Pro\*COBOL source and COBOL copybooks
  - **MISC** directory contains the Perl scripts used on the NT platform and Shell scripts for UNIX
    - On VMS, the COM directory contains the DCL scripts
  - **DBPROCS** contains the source for database procedures, functions, triggers, and O:A functions and procedures
  - **FORMS** contains the source for the forms, libraries, menus and reports
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- ### Banner Product Directories
- **HELP** files for the modules forms
  - **PLUS** directory contains SQL\*Plus scripts
  - **LOADER** contains any SQL\*Loader scripts
  - **VIEWS** contains source for the database views and O:A views
  - **INSTALL** contains the \*.sctdmp file of the product
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### General Directories

- **General directory contains some special subdirectories:**
  - EXE contains all the executables for all products
  - GIF contains the .gif files used in Banner
  - ICO contains the icon files used in Banner
  - DESKTOP contains the GODDTOP for spreadsheet budgeting
  - EXTRAS contains the scripts for SSO
    - (MAY have been replaced by bansso at root level)

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### Banner - Important Users

- **BANINST1**
  - Owns all the functions, packages, procedures, and views
  - WTAILOR owns the packages for SSB (all start with tw\*)
- **BANSECR**
  - Owns the Banner security tables and objects
  - No other user should have access to BANSECR's objects
  - The only exception is for a site-specific BANSECR user

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### Banner New Installation – Step 2

- The install process then builds some environment manipulation scripts for managing Banner variables (bansubs.shl):
  - banenv - for the Bourne shell
  - cbanenv - for the C shell
  - \*banali - for printer aliasing for the various shells
  - Banlogic - for VMS
  - Registry entries or batch files used for NT

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**Banner New Installation –  
Environment creation**

- The next step of the install process will create an Banner environment on the RDBMS server
- Build the LINKS directory (banlnks.shl –UNIX only)
- Update the environment (bansenv.shl)
  - oraenv is then modified to point to the banenv and cbanenv files (UNIX)
  - oratab is modified with the new database
  - banlogic.com is modified with directory locations (VMS)
  - Registry or Batch file banenv.bat (NT)

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**Banner New Installation – Step 3**

- The next set of steps creates the Banner database
  - Uses a pre-created database (bancrdb.shl, bancrtb.shl are provided for reference)
  - Creates the Banner accounts (bancrus.shl)

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**Banner New Installation – Step 4**

- The next set of steps in the NEW install will create the database objects
  - Review the install document carefully. The DAD user WWW2\_USER needs to be created before these steps
  - Import Banner tables and sample data (banimp.shl)
  - Build Banner procedures and functions (bandbpr.shl)
  - Import views and create synonyms (banwswy.shl)

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**Banner New Installation – Steps 5 and 6**

- **Compile C & COBOL**
  - Create makefiles
  - Compile General objects
  - Test the compiles

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**Multiple Banner environments**

- **Multiple Banner software environments**
  - Initial install only builds one code tree
  - Need to copy this to another tree to use as an upgrade staging area
  - Must manage the access to these different sets of Banner code by using:
    - Shell scripts/registry entries/DCL procedures
    - Banenv/banlogic.com
    - DOS .bat files

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**Multiple Banner databases**

- **Multiple Banner instance databases**
  - Initial install only built one database
  - Need to clone this to a training database and a production staging database
  - Must manage the access to these different Banner databases by using:
    - Shell files/registry entries/DCL procedures
    - banenv/banlogic.com
    - DOS .bat files

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**Banner Default Databases - SEED**

- Out-of-the-box Banner
- Used to run new Banner upgrades against first
- Upgrade issues are then SunGard Higher Education issues
- Work out the details before upgrading production database

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**Banner Default Databases - TRNG**

- Used for implementation training
- Out-of-the-box Banner with some additions
  - Training user accounts
  - Training data
- Usually cloned from SEED

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**Banner Default Databases - PPRD**

- Used for implementation and conversion
- Out-of-the-box Banner with some deletions
  - Most SEED data is cleaned out of the database
- Used to build the Production database
- Should be backed up as soon as users start populating validation and rule tables

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**Exercise 4**

- You've just upgraded Oracle – will you be able to compile Pro\*C and Pro\*COBOL?
- Does the Banner installation itself set up the Job Submission user ID and directory?
- What user IDs do your users use when logging into the PPRD database?
- What is the first database that is installed?

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**Banner environment**

- Multiple Banner environments will need both Oracle and Banner variables set
  - .profile or .login calls oraenv (UNIX)
  - login.com calls orauser\_SID.com (VMS)
  - ORAENV sets:                      orauser\_SID.com sets:

ORAENV_ASK	--
ORACLE_HOME	ORA_DB
ORACLE_SID	ORA_SID
PATH	SQLPATH

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**Banner environment - Others**

- VMS
  - Command procedural calls:
    - Banlogic.com
    - Orauser.com
- NT/Win2000
  - Path environment
  - Registry

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### Banner environment variables

- Based on the SID, the appropriate environment file is called

BANENV/Registry sets:	BANLOGIC sets:
• BANNER_HOME	BAN_HOME
• BANNER_LINKS	BAN_ROOT
• BANNER_ADMIN	<MODULE\$PATH>
• EXE_HOME	GEN\$EXE
• ORACLE_PATH	ORA_PATH
• PATH	SQLPATH

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### Banner database performance

- Management of a Banner database involves proactively managing:

- Memory
  - Are your users complaining?
  - Is your system page-faulting?
  - Running SQL scripts to maintain the system
- Disk storage
  - Fragmentation
- Database objects
  - Invalid state

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### Banner Database Administration

- Close relationships with the System and Network staff
  - Patches and upgrades are maintained
  - Backup and recovery in place
  - Network access
- It also involves being able to:
  - Create databases
  - Clone databases
  - Upgrade all Oracle software
    - "How to have a life and be a DBA also"

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**Banner - Memory Management**

- **Banner moves a lot of data and involves a lot of code**
  - OLTP vs. DSS
- **This means that the DBA must take an active stance on monitoring and managing Banner's use of memory**
  - Checking the SGA:
    - How often does the database get data from disk vs. memory?
    - How often are the stored packages accessed?

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**Oracle - Memory Management**

- **The main areas the DBA must be concerned with are:**
  - Data Base Buffers - v\$sysstat
  - Shared pool - pins and gets
  - Redo logs - Checking the alert logs, v\$sysstat
  - Data Dictionary cache - v\$rowcache
  - Library cache - v\$llibrarycache
  - Sort Areas - temporary tablespace

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**Banner - Storage Management**

- **Banner databases take active storage management**
- **Tables grow constantly**
- **Indexes become unusable**
- **Database use causes problems like storage fragmentation and row chaining**
- **New tables with upgrades**

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**Oracle - Storage Management**

- The storage management tasks the DBA will be most heavily involved in are:
  - Tablespace growth
  - Table sizing
  - Rollback segment sizing (obsolete with undo space management)
  - Restructuring the database
    - Resizing/moving tables and indexes
    - Tablespace placement
    - RAID vs. non-RAID

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**Banner – Disk Storage Management**

- RAID
  - Important to have for an Oracle system
  - Jbod – Lowest data cost – low overhead
  - 0 – low data cost – load balancing
  - 0, 0+1 – high data cost – most expensive
  - 5 – Highest data cost – safe
    - It takes four I/Os for one write (read data, read parity, write data, write parity)
    - Minimum of three disks, plus 66-87% of space
    - The more disks, the higher the gain
    - Not good with REDO – Sequential vs. random writes

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**Banner - Object Management**

- Banner is installed in one tablespace, usually named DEVELOPMENT
- Can be divided into many tablespaces as required by the institution
  - Access reasons
  - Performance reasons
  - Maintenance reasons
  - Multi-institution reasons

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**Banner utilities**

- SunGard Higher Education-supplied data catalog tool GURPDED
  - Run through Job Submission
- SunGard Higher Education-supplied tool called GURDDL
  - Used to resize tables
  - Used to resize indexes
  - Handles the referential constraints
  - Handles the permissions
  - Handles the synonyms
  - Can be used to move one or many tables

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**Oracle fragmentation**

- Databases can fragment, even with the best of software
- Fragmentation causes performance problems
- Tools are being developed to perform background defragmentation
- Most common method of defragmentation is export/import

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**Oracle locally managed tablespaces**

- Oracle is moving towards a methodology that will reduce table management
- Uses a few basic extent sizes for each tablespace
- Tables are grouped into tablespaces according to size and growth characteristics

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**Banner – General object management**

- There are sets of scripts provided with Banner that are used to compile/recompile database objects
  - General Packages, Procedures, Functions, and Triggers
    - /sghe/banner/general/dbprocs/gendbpr.sql
  - General Views
    - /sghe/banner/general/views/genview.sql

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**Banner – Student object management**

- There are sets of scripts provided with Banner that are used to compile/recompile database objects
  - Student Packages, Procedures, Functions, and Triggers
    - /sghe/banner/student/dbprocs/studbpr.sql
  - Student Views
    - /sghe/banner/student/views/stuview.sql

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**Banner - Object management utility**

- SunGard Higher Education-supplied tool called GURALTR
- Searches database for invalid objects and builds a recompile script
  - Used to recompile database objects (not sys nor system)
    - Packages
    - Package Bodies
    - Triggers
    - Procedures
    - Functions

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**Exercise 5**

- How many different Banner code trees does your oraenv script handle?
- What is the purpose of the BANNER\_LINKS directory?

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**Further discussion**

- Even though studbpr.sql is in the Student product directory, what schema owner owns the database procedures in this script?

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**Compiling invalid objects**

- Run utlrp.sql as SYS to compile ALL database objects
  - This is found in ORACLE\_HOME/rdbms/admin
- Run GURUTLRP.sql from the Banner directories to compile all objects
  - This script must be run as SYS
- Use GURALTR as SYSTEM to recompile ALL non-SYS and non-SYSTEM database objects
  - This is in BANNER\_HOME/general/plus
- BANINST1 owns most database packages, procedures, functions and views
  - Run GURALTRB as BANINST1 to recompile just BANINST1 objects
- After manipulating ANY database objects, run GURALTR to fix any broken dependencies
- Run multiple times to resolve dependencies

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**Banner database triggers**

- **BANINST1 does not own the database triggers**
  - Each product owner owns their respective set of database triggers
  - Compile scripts for the triggers are located in the product's dbprocs directory in the xxxdbpr.sql file
  - Must use these in conjunction with GURRDDL when rebuilding tables

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**Banner administrative software**

- There is an administrative directory for Banner on the RDBMS server
- **\$BANNER\_HOME/admin**
  - banenv (UNIX/NT)
  - banlogic (VMS)
  - profile.ban
  - upcase.shl

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**Banner non-database related software**

- **Banner also requires management of all the software outside of the database**
  - Executable compiles
    - Pro\*C
    - Pro\*COBOL
  - SQL\*Plus scripts
  - SQL\*Loader scripts

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### Banner Pro\*C - 1

- Each product owner may have a set of Pro\*C programs
- Located in /sghe/banner/<product>/c
  - Based on old Oracle RPTs
  - Ugly but consistent design
- .h - Header files (General/c only)
  - guarpfe.h - Routines for RPT emulation
  - guastdf.h - Routines for C print formatting

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### Banner Pro\*C - 2

- .c - C source files (General/c only)
  - guarpfe.c - Routines for RPT emulation
  - guastdf.c - Routines for C print formatting
  - guaorac.c - Routines for Oracle interface
- .pc - Pro\*C source files
  - gurjobs.pc - Job Submission Pro\*C program
  - gjrrpts.pc - Banner Reports print program

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### Banner Pro\*C - 3

- The compile scripts for each product's set of Pro\*C programs are in the corresponding MISC directory (the same applies for OVMS and NT)
  - General Pro\*C
    - /sghe/banner/general/misc/gencompic.shl
  - Student Pro\*C
    - /sghe/banner/student/misc/stucmplc.shl
  - Finance Pro\*C
    - /sghe/banner/finance/misc/fincmplc.shl

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### Banner Pro\*COBOL - 1

- Each product owner may have a set of Pro\*COBOL programs
- Located in /sghe/banner/<product>/cob
- /sghe/banner/general/cob also contains the Pro\*COBOL copylibs
- \*.pco - Pro\*COBOL source files

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### Banner Pro\*COBOL - 2

- The compile scripts for each product's set of Pro\*COBOL programs are in the corresponding product MISC directory
  - General Pro\*COBOL
    - /sghe/banner/general/misc/gencomp.shl
  - Student Pro\*COBOL
    - /sghe/banner/student/misc/stucmpl.shl
  - Accounts Receivable Pro\*COBOL
    - /sghe/banner/arsys/misc/tascmpl.shl

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### Banner SQL\*Plus

- Banner also has SQL\*Plus scripts that are used by the various Banner products
- Located in: /sghe/banner/<product>/plus
- General also has some scripts that are used for admin and upgrade purposes
  - LOGIN.SQL
  - GURALTRB
  - GURRDDL
  - GOSTAGE

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**Banner SQL\*Loader**

- Banner also has SQL\*Loader scripts that are used to load outside data
  - Test scores
  - EDI
- Located in: /sghe/banner/<product>/loader
  - \*.ctl - SQL\*Loader control files

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**Exercise 6**

- What SQL will compile all Banner objects?
- What objects does BANINST1 not own?
- Where will you find the file(s) that set up the environment for each Banner code tree?

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**Further discussion**

- What is the fully qualified name of the script to compile the GSASECR.fmb file?

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**Banner - Access methods**

- Considerations need to be made for:
  - Access to the Banner system
    - Database(s)
    - Forms
    - Report output
  - User vs. developer access
  - Banner System vs. SQLPLUS
  - Microsoft Access
  - Financial aid load files

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**Creating an Banner Database**

- Production databases are usually created sometime after the initial Banner installation by the site
- Memory sizes, block size, disk storage requirements, network considerations, and user load must be taken into account when configuring the production database

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**Banner Database creation methods**

- Creation is done through one of the many tools available
  - Command line method has more creation flexibility
    - Refer to createdb.sql
  - GUI mode (DBCA) is easier, but requires modification before the Banner data can be loaded
  - Clone the PPRD database

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### Cloning a Database

- **Cloning is done through a database recovery mechanism**
  - Database files are copied to new directory structure
  - Produce a control file re-creation script by issuing as sys:
    - `alter database backup controlfile to trace;`
  - New instance is "recovered" using modified control file, and new control files are created
  - Issues with doing this
    - Pre Oracle8i, cloning was easy
    - Oracle8i and later have a DBID and loss of all RMAN or datafile information

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### Cloning a Banner Database – Oracle 8i or later

- **Use RMAN to make a backup of the source database**
- **RMAN preserves the control file entries and DBID**
- **The clone database is created and opened NOMOUNT**
- **Run the duplicate command in RMAN to perform the clone**
- **The procedure is fully documented in the 'Backup and Recovery Concepts' manual**



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### Banner - Backup Strategies

- **Cold backups**
  - Involves taking the database offline
  - Should be performed occasionally
- **Online backups**
  - Allows the database to remain in service
  - Requires a large UNDO to 'queue up' the DML.
  - Must be in archive log mode.
- **RMAN**
  - Only backs up the changed blocks
  - Uses the Large pool

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**Exercise 7**

- Why is the method used to clone Oracle7 databases not a good one for Oracle8i and later databases?
- Which backup methods require that the database be down?
- Can RMAN backup a non-archived database?

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**Self Service Banner (SSB) Products**

- The Self Service Banner ... products are an add-on set of software functionality
- Provides a self-service browser interface to many Banner functions
- Is not "Internet Native" Banner
- Customizable look and feel
- Rules-defined access and display

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**Self Service Banner**

- Implemented by using database packages and procedures
- Generates dynamic HTML pages from the database
- Uses Oracle Application Server's modplsqli module
- Uses Oracle's PL/SQL Toolkit package
- Banner has an administrative tool called Web Tailor

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### Documentation - SSB

- The end user guides are available through Banner Bookshelf through the Product User Manuals
- The Upgrade Guides and Release Guides are available through Banner Bookshelf
- Each product has its own set of Guides
- Web Tailor has its own set of Guides

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### Self Service Banner Software Install

- Self Service Banner... installs are done on the Banner RDBMS server
- Packages are built in the database
- The software is installed in SSB product directories
  - /sghe/banner/aluweb
  - /sghe/banner/facweb
  - /sghe/banner/finweb
  - /sghe/banner/genweb
  - /sghe/banner/payweb
  - /sghe/banner/scomweb
  - /sghe/banner/stuweb
  - /sghe/banner/wtlweb

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### Self Service Banner Software Structure

- Each Self Service Banner ... product directory contains some of the following structure:
  - c - C programs used in web applications
  - dbprocs - Web packages
  - gif - graphics objects for buttons
  - html - Product web pages
  - misc - Web administrative scripts

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**Self Service Banner - Install**

- There is no Banner install on the web server
- The server is configured to connect to the Banner database through Oracle Net
- Self Service .gif and .htm files are copied from the database server to the web server
- An Apache listener is created to present the initial page for general access to the SSB system, homepage.htm

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**Self Service Banner  
Web Server Install**

- From the web server, for each Banner instance:
  - Create a DAD (Database Access Descriptor)
    - Created with several versions of Oracle's GUI tools
    - Uses a generic username/password/connect descriptor that logs into the database on behalf of the SSB user
  - http://host.domain.edu:1810

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**DAD – AS10g**

- Go to the AS Welcome page
  - http://host.domain.edu:1810
    - Click on HTTP Server
    - Click on Administration
    - Click on PL/SQL Procedures
    - In the DAD section, click on Create
    - Click General
    - DAD Name: /pls/SID
    - Username: www2\_user
    - Password: u\_pick\_it
    - Connect String: DBhost:1521:SID
    - Connect String Format: SIDFormat (host:port:SID)
    - Default Page: homepage.htm

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### Self Service Banner Web server directories

- Copy .gif and .htm files for each product from the directories on the RDBMS server to the appropriate directory on the web server:
  - /sghe/banner/\*web/gif →
    - /sghe/ssb/SID/\*gifs
  - /sghe/banner/\*web/htm →
    - /sghe/ssb/SID/\*help

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### Self Service Banner Web Server listener

- Configure the Web server to 'serve up' SSB
- Create a virtual host with:
  - Set DocumentRoot to the /u01/app/sghe/ssb/SID directory
  - Set Port to the Port that the users will use
  - Set Listen to the Port that Apache will listen for
  - Set DirectoryIndex to homepage.htm
  - Set "Before Procedure" value to "twbklist.p\_main"

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### Self Service Banner homepage.htm

- The next step is to set up the homepage.htm file
  - Copy from:  
/u01/app/sghe/ssb/SID/wlthelp/homepage.htm
  - To:  
/u01/app/sghe/ssb/SID/homepage.htm
  - Replace //your server name:port/test/owa/ with your site's mod\_plsql reference and DAD
    - i.e. //host.domain:9030/pls/SID/
    - /pls for modplsql alias
    - /SID for the DAD name

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**Self Service Banner  
Objects**

- The only Banner software to manage on the web server are the web objects needed by the Self Service products
  - .gif files
  - .htm files
  - Web Tailor image files
  - Java
  - CSS for cascade style sheets
- These will be updated as new versions come out

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**Modify database**

- Run the following SQL statements on the database server

```
— UPDATE twgbparam
  SET twgbparam_param_value = 'WWW2_USER'
  WHERE twgbparam_param_name = 'WEBUSER';

— UPDATE twgbwrul
  SET twgbwrul_cgibin_dir = '/pls/SID';
```

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**Self Service Banner  
RDBMS Software**

- There are sets of scripts provided with Banner that are used to compile/recompile database objects
- Examples
  - Stuweb Packages, Procedures, Functions, and Triggers
    - /sghe/banner/stuweb/dbprocs/bstudbpr.sql
  - Genweb Packages, Procedures, Functions, and Triggers
    - /sghe/banner/genweb/dbprocs/bgendbpr.sql

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**Self Service Banner Client**

- Netscape 4.x
- Explorer 5.x/6.x
- Generally, stay a release or two back from the latest and greatest browsers
- Supports other browsers (Opera, Mozilla, etc.)
- Could use Windows versions from 95 to the present
- Can use MacOS
- SSL or VPN for secure access
  - High encryption is not available on older OS versions

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**Exercise 8**

- Where is each web page generated from?
- What Banner software must be on the Web server?
- How does a SSB user connect to the database?

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**Further discussion**

- How would you reload the PL/SQL toolkit in the database?

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### Internet Native Banner - Parts

- **In Internet Native Banner, the Oracle forms software has been modified to run in two parts:**

- The forms runtime process on an application server as either
  - Forms CGI
  - Forms Servlet
- A Java JVM applet that performs the display and data entry tasks on the client

- **The forms are converted to Java and displayed by the JVM**

*Note: Forms CGI is explained in this document*

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### Internet Native Banner - Installs

- **AS10g Forms and Reports Services Standalone**
  - Forms and Reports is included with OAS10g Enterprise Edition release
- In any case, always apply the latest supported Oracle Forms and Reports patch sets

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### Preparing to generate forms

- Copy .fmb, .pll, .mmb, files from database server to /u01/app/sghe/inb/SID/forms/fmb
- Copy xxxform.shl files from database server to /u01/app/sghe/inb/SID/forms/bin
- On the INB server, copy \$ORACLE\_HOME/bin/fgenm.sh to /u01/app/sghe/inb/SID/forms/bin and edit the copy appropriately
- Edit \$ORACLE\_HOME/network/admin/tnsnames.ora file for appropriate SID
- Edit xxxform.shl files - change *password* to *password@SID*

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### Generating forms

- `cd /u01/app/sghe/inb/SID/forms/fmb`
- `./u01/app/sghe/inb/SID/forms/bin/fgenm.sh`
- `sh /u01/app/sghe/inb/SID/forms/bin/xxxform.shl`
- `tar cvf fmx.tar *.fmx *.plx *.mmb`
- `mv fmx.tar ../fmx`
- `cd ../fmx`
- `tar xvf fmx.tar`

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### Helpful additions

- Create `/u01/app/sghe/inb/SID/forms/bin/allform.shl` script
  - Invokes `fgenm.sh`
  - Invokes all the `xxxform.shl` scripts
- Copy `genform.shl` script to `oneform.shl` script
  - Modify to look for all necessary `.plx` and `.mmb` files
  - Invokes `fgenm.sh`
  - Uses a parameter to generate one form only

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### INB – httpd.conf

- Configures the Apache Web server to 'web up' INB
- Edit the HTTP listener via the EM Console
  - Set `DocumentRoot` to the top level directory for your server
  - Set `Port` to the Port that the users will use
  - Set `Listen` to the Port that Apache will listen for
- Another option is to create an include file to set up a virtual host for access
- Either method requires a restart of the HTTP server

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**INB – formsweb.cfg**

- Servlet configuration file
- Provides several parameters to the browser
  - System
  - User
  - Html page
  - Applet
  - Jinitiator

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**INB - Jinitiator**

- Different versions of Jinitiator can be installed and used simultaneously
- Users download Jinitiator once
  - Subsequent uses of Internet Native Banner use the downloaded copy on the client machine
  - Upgrades to new versions of Jinitiator will require new downloads

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**INB – Forms and Reports environments**

- Copy `$ORACLE_HOME/forms/server/default.env` to `$ORACLE_HOME/forms/server/sid.env`
- Add the following lines via the EM Console
  - `TWO_TASK=SID`
  - `TNS_ADMIN=/u01/app/sghe/inb/SID/conf`
- Change the following lines for your environment
  - `FORMS_PATH=/u01/sghe/inb/SID/forms/fmx`
  - `REPORTS_PATH=/u01/sghe/inb/SID/reports/rep`
  - `GRAPHICS_PATH=/u01/sghe/inb/SID/forms/fmx`

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### INB – Web based output

- The INB Job Submission "save and print" temporary files are located on the web server
- They utilize the DAD technology to be presented over the web
- Form GJIREVO handles the program and report output files
  - They require a DAD (Database Access Descriptor).
- Reference the DAD created by example in the workbook
- Enter the values on GUAUPRF
  - For "Enter the name of your Web Output URL," enter  
`http://host.domain:port/pls/<SID>`

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### INB – .gif files

- The database server contains .gif files for Internet Native Banner Forms in the form of Java Archives.
- On your database server change directory to the location of your jar files
  - \$BANNER\_HOME/general/java
- Copy these to the /u01/app/sghe/inb/java directory on the INB server

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### INB – Files in general/extras

- fmrpcweb.res (copy or ASCII FTP to \$ORACLE\_HOME/forms and rename to fmrweb.res)

— For F1 display help, add this line to fmrweb.res

```
112 : 0 : "F1" : 1004 : "Help (Item Properties)"
```

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### Starting INB – NT/Win2000

- **Click on Start -> Settings -> Control Panel -> Services**
  - Stop/Start the OracleHTTPServer service
  - Stop/Start the OracleReportServer service
- **Execute INB (Internet Native Banner)**
- **Start your browser with the URL (example only):**
  - `http://host.domain:port`
- **When the GUAINIT form starts, enter**
  - Username: saiusr
  - Password: u\_pick\_it

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### Starting INB - UNIX

- **Log on to the web server as oracle**
- **Set up environment:**
  - . `oraenv` (use `oratab` entry for AS10g)
  - or
  - `source $ORACLE_HOME/bin/iasenv.sh`
- `$ORACLE_HOME/opmn/bin/opmnctl startall`
- **Start a web browser and enter your URL:**
  - `http://host.domain:port`

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### Exercise 9

- **What is the major difference between `base.htm`, `baseie.htm` or `basejini.htm`?**
- **You just installed a new patch to Forms – what do you need to change for a new version of Jinitiator?**

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SITE-SPECIFIC SAMPLE PAGE:  
`http://server.domain.edu:9099`

- **Unsupported html page**
  - Shows what is initially available
  - Shows how to create links
- **Located in /u01/app/sghe/inb/htdocs/main.html**
- **Links to INB pages**
- **Links to SSB pages**
- **Link to Banner Bookshelf**

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**More on Internet Native and Self Service**

- **SunGard Higher Education has a three day class**
  - Installing AS10g Forms and Reports (INB)
  - Installing AS10g J2EE and WebCache (SSB)
  - Configuring both
- **Reference - Mid-Tier Implementation Guide**

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**End of Section**

*Any Questions?*

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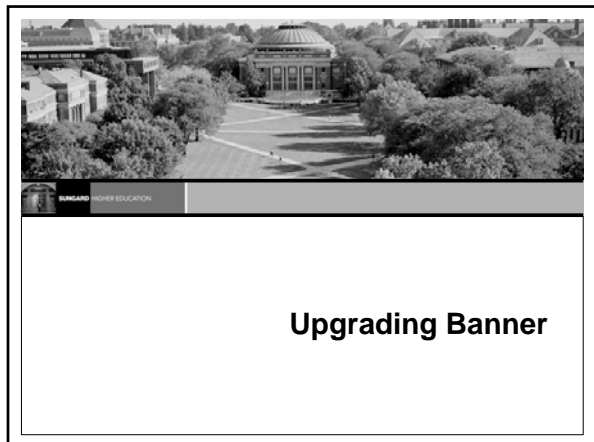
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**Upgrading Banner**

- The process of maintaining Banner involves frequent upgrades for both enhancement and error correction purposes
- These tasks will involve using:
  - Customer Support Center
  - Patches
  - Upgrades

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**Customer Support Center**

- The Customer Support Center is SunGard Higher Education's web site for:
  - Information on the Banner products
  - FAQs
  - Finding information on defects
  - Finding and downloading patches
  - Entering technical request contacts
- You must be a valid SunGard Higher Education customer

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**Customer Support Center - Account**

- Requires setting up an account
  - Specific username and password
- To set up an account:
  - Start at <http://www.sungardhe.com>
  - After logging into the account, the Customer Support Center home page displays several options.

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**Customer Support Center - Support**

- The Customer Support Center is the avenue through which to report Banner problems
  - ActionLine support is now available via the Customer Support Center
  - Customer Support Center goes into the same helpdesk pool as the ActionLine

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**Banner patches and upgrades**

- Most enhancements and patches will be downloaded from the Customer Support Center
- As issues are resolved and error corrections developed, these fixes will be bundled into patch sets and posted on the Customer Support Center electronic download page
- These patch sets are compressed and encrypted in a .trz file
- Must use a special program to decrypt it.
  - Windows – edunld.exe
  - OpenVMS and UNIX – download decryption tool

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**Finding patches**

- The first step is to use the Known Issues search engine to locate defect and associated patch numbers
- New patch postings are also broadcast on the SunGard Higher Education listserv BPOST
- Once the proper patches are located, invoke the download gadget to retrieve them

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**Downloading patches**

- There is a web gadget that allows for easy packaging and downloading of patches and the decryption program
- Follow the directions on the main Customer Support Center page for downloading patches to set it up
- Set up a directory structure to download and decompress/decrypt these patches

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**Installing patches**

- Once the patch is downloaded, decompressed, and decrypted, review the install instructions
- Most downloads involve new software or database objects, which will need to be
  - migrated to proper software directory
  - compiled as needed
  - installed into the database as needed.

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**Managing patches**

- Patch management is one of the most challenging of the Banner maintenance duties
- A methodology and conventions for storing, testing, and applying patches should be developed
- Patch installation does not necessarily coincide with upgrade installations

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**Banner Upgrades**

- Banner upgrades come in two types and listed as full upgrades:
  - Cumulative
  - Interim
- Upgrades are applied in two parts:
  - Upgrade applied to the database
  - Upgrade applied to the software

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**Upgrade dependencies**

- Each Banner product has its own upgrade procedure
- These upgrades must be applied in a particular order to build dependencies properly
- There is a dependency matrix for all upgrades in the Banner general FAQ section
- Read Page Six of the Upgrade Guide for the overview

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### Database Upgrades

- GOSTAGE is a PL/SQL program that builds a database upgrade script based on two Banner upgrade tables:
  - GUBSMOD - Holds Modification Identifier
  - GURSSQL - Holds Modification SQL
- Creates and runs a file called DOMOD.SQL which will apply all of the upgrade changes to the database

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### Software Upgrades

- The upgrade to the software happens in sync with the database upgrade
- All changes to source code are migrated to the software tree during this stage
- All Pro\*C, Pro\*COBOL, and Forms executables are compiled and moved to the appropriate executable trees
- Forms source (.fmb, .pll, .mmb) need to be migrated to the INB web server(s)

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### Managing Upgrades

- How many upgrades - the bare minimum
  - Remember the O/S and Oracle
  - The database server is not the only upgrade
- Timing the upgrades
- READ THE UPGRADE DOCUMENTS
- Media verification
- Always apply upgrade to the baseline database SEED first

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**Step dependencies**

- Page 8 of the Upgrade Guide contains a chart that will help you through the upgrade process
  - The chart lists which steps will be done and which are not applicable
- The last column is to be used to get a time value for that step
  - Once you have done an upgrade first in a non-production instance, you then know how long the upgrade will take
  - Users are always asking "How long will it be down?"

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**Do the upgrade**

- Let's go through one of the recent Upgrade Guide documents.

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**End of Section**

*Any Questions?*

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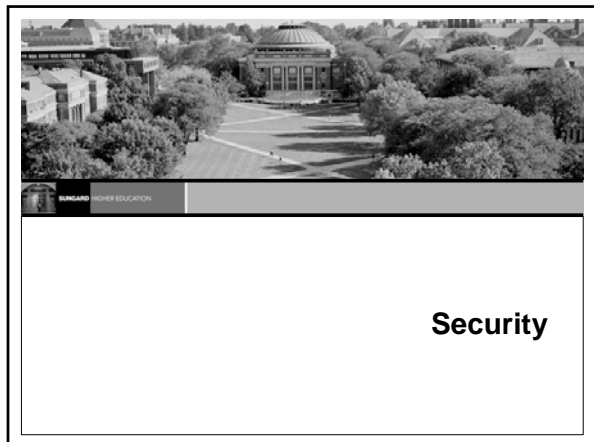
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**Authentication vs. Authorization**

- With access to Banner databases now possible from the Internet, security had to be redesigned to handle the following two issues:
  - Authentication
    - How do I know you are who you say you are?
  - Authorization
    - Can you do this?

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**Oracle Security**

- Privileges
  - Object Privileges
  - System Privileges
- Roles
- Default Roles and passwords

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**Banner Security**

- Objects
- Classes
- Roles
- Users
  - BANSECR
- Security Routines
- Value based security

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**Oracle Access Rights**

- **Oracle provides two levels of access to database objects and data:**
  - Object level privileges
    - Specific access to specific objects
    - Example: SELECT ON SPRIDEN
  - System level privileges
    - General access privileges to groups of objects
    - Select on any table

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**Oracle Roles**

- Oracle roles are pseudo-users
- Many system and/or object privileges are granted to the role
- These roles are then granted to Oracle users
- Roles provide a grouping ability
- Roles can be nested

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**Oracle Roles –  
Which Privilege?**

- When there are many access paths to an object, the most powerful of the underlying privileges will be in effect
- Roles can be passworded, requiring knowledge of the password to invoke the role

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**Banner Security Model**

- Banner takes a novel approach to security
- Banner uses roles with passwords
- The end user does not know the password to invoke the role
- The process the user is trying to perform has the ability to invoke the role
- Once the process ends, the role is revoked

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**Banner Security Classes**

- Banner processes are grouped into classes
- Classes are a sort of pseudo-role
- End user is granted access to the class
- End user is granted an associated role without knowledge of the password
  - BAN\_DEFAULT\_Q - Query-only use
  - BAN\_DEFAULT\_M - Maintenance use
- End user is also assigned a default role

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**Banner Security Process**

- When the end user starts the process, access to the class is checked
- If access to the class is granted, the associated role is invoked
- End user has temporary access to the database objects
- End user has access rights revoked at process end

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**Banner Security - GSASECR**

- GSASECR is a special Banner form designed to manage Banner security
- GSASECR should not be available to anyone but a security administrator
- BANSECR is the only allowed user of the GSASECR form (see distributed security)

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**Banner Security - GSASECR**

- GSASECR is used to manage:
  - Objects (Processes/Jobs, Forms)
  - Classes
  - Roles
  - Users
  - System Security

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### Banner Security - GSAVPDI

- Functions the same way as GSASECR
  - Must be logged in as BANSECR
- On first entry, you select one of the following:
  - User maintenance
    - You set up what institution code the user will use
  - Institution code maintenance
    - Identifies all valid institution codes

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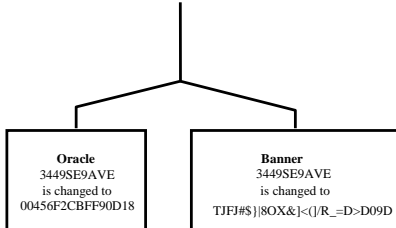
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### Banner role level security

```
CREATE ROLE BAN_DEFAULT_M  
IDENTIFIED BY 3449SE9AVE;
```



GSASECR Role Creation

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### Banner - Adding security to site processes

- The SQL code for security
- Installing security in your programs
  - C programs
  - COBOL programs
  - Forms

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### Custom code

- All objects created that are not baseline are required to be added to the Banner system
  - GUAOBS
  - GSASECR
    - Object maintenance
    - Class maintenance
    - User maintenance
  - Job Submission

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### Code Invoking Process

- The object name is passed to the procedure
- The seed numbers are passed to the procedure
- The three-phase decryption takes place
- The role password is invoked
- The local variables are cleared

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### SQL – FAQ#1979

- Each SQL script requires a supporting file to submit it
  - This file needs to be in the correct path for its OS
    - VMS -- in logical GEN\$COM or BAN\_COM\$
    - UNIX -- in environment variable \$BANNER\_LINKS or \$PATH
    - WinNT/2000 -- in environment variable PERL5LIB or %BANNER\_HOME%\general\misc
- VMS -- test\_sql.com

```
#! Test of Job Sub process to run SQL SCRIPT.
$ sqlplus ''UIPW' '@test_sql
```
- UNIX -- test\_sql.shl

```
# test_sql.shl
# mtytler 7/31/97 testing job sub with sqlplus
sqlplus $UIPW @test_sql.sql
```

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## SQL - continued

- WinNT/2000 -- test\_sql.pl

```
# test_sql.pl
# mtytler 4/9/2002 testing job sub with sqlplus
use sctban;
&sctban_determine_os;
&sctban_os_specific_env;
&sctban_jsub_env;
$a1 = $ARGV[0];
$a2 = $ARGV[1];
$a3 = $ARGV[2];
$a4 = $ARGV[3];
$a5 = $ARGV[4];
$banner_exe = $ENV{"BANNER_EXE"};
open(PPROCESS,"|sqlplus ${sctban_user_pass}
\@test_sql.sql");
close(PPROCESS);
```

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## SQL - test\_sql.sql

```
rem mtytler 4/9/2002
rem test_sql.sql
rem SQL SCRIPT TO TEST JOBS SUB PROCESS
spool test_sql;
select * from dual;
spool off;
-- test_sql.sql needs to be in the correct path for its OS


- VMS -- in logical ORA_PATH
- UNIX -- in environment variable $ORACLE_PATH
- WinNT/2000 -- in environment variable SQLPATH


-- Finally, add the object in GSASECR, GUAOBS and job submission
```

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## C programs - FAQ#2587

- The makefile includes the necessary object file at link time after the program is compiled
- Insert the code below, compile it with the provided sctproc(.mk, .com, .pl), then add the object in GSASECR and GJAJOB

```
#include "guarffe.h" /* Holds rptopen function */

EXEC SQL INCLUDE guorac.c;
/* Holds the user_pass variable below */

int main(int argc, char *argv[])
{
    rptopen(user_pass, argc, argv);
    /* rptopen does the proper setup for security.*/
    login(); /* Calls Banner Security from guorac2.pc */
}
```

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**C programs – FAQ#2587 (cont.)**

- If your program is a copy of baseline (i.e. - \$BANNER\_HOME/general/c/gjrrpts copied to gzrrpts.pc), then you must change a line in the program before recompiling it
- Find the line  
`strcpy(rpt_name, "GJRRPTS");`
- and change it to  
`strcpy(rpt_name, "GZRRPTS");`

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**COBOL programs**

- Insert the line  
`SQL EXEC INCLUDE SETSEED END_EXEC`  
into the declarative section
- Move the program name into OBJECT-NAME
- Insert the line  
`SQL EXEC INCLUDE SETROLE END_EXEC`  
into the PROCEDURE DIVISION
- Refer to the COBOL standards section in General\_trm.pdf file (section 1-49)

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**Forms**

- Attach the library GOQRPLS
- Create the LOAD\_CURRENT\_RELEASE trigger
- Reference the G\$\_REVOKE\_ACCESS and the G\$\_VERIFY\_ACCESS triggers from the GOQOLIB reference library form
  - If you attach the new G\$\_FORM\_CLASS, G\$\_APPL\_FORM\_CLASS, G\$\_INQ\_FORM\_CLASS, or G\$\_VAL\_FORM\_CLASS to your form, you will automatically inherit these triggers

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**Forms (cont.)**

- If you do not reference those triggers from GOQOLIB , you will need to create a pre form trigger and a post form trigger to accomplish the same effect  
—Refer to the Security manual, section 1-11
- If you have created a custom form (for example, if you copied SPAIDEN.FMB to form WPAIDEN.FMB), copy SOQMENU.FMB to WOQMENU.FMB and place it in the FORMS\_PATH

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**Reports – FAQ #1582**

- You need to create the security check sums for the new report TESTRPT.REP  
— gurchks bansecr/u\_pick\_it@database testrpt.rep 1.0 plus33 G  
BAN\_DEFAULT\_M
- This should create a security checksum value
- Enter the report in GSASECR and GJAJOB
- The user also needs permission to the underlying tables – FAQ#1729

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**Banner Web - SSB**

- The Self Service products are secured by a valid PIDM/PIN combination
- Each web product requires a role to be set up:
  - STUDENT role = if ID has a SGBSTDN record
  - FACULTY role = if ID has a SIBINST record
  - EMPLOYEE role = if ID has a PEBEMPL record
  - ALUMNI role = if ID has an APBCONS record
  - FINANCE role = if ID has a FOMPROC record
  - WTAILORADMIN role = assigned (TWGRROLE)

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### Banner Web - SSB

- To create your own package within the SSB products, a procedural call must be added
- It will validate that the user has a valid PIDM

```
PROCEDURE twbkwbis.F_ValidUser(pidm number)
```

- **Example**

```
CREATE OR REPLACE PACKAGE BODY Hello_Chris
IS
PROCEDURE P_DisplayHello IS
  pidm number;
BEGIN
  IF NOT twbkwbis.F_ValidUser(pidm) THEN
    RETURN;
  ELSE http.print('Your internal id number is :'||pidm);
  END IF;
END;
```

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### Adding processes to Banner Security

- After the site process (form, procedure, Oracle report) has had the security code added to it, the object must be added to the Banner Security tables.

- The steps are:

- Create the new object in GSASECR
- Add the object to Banner Classes
- Assign a role to the object/class combination
- Resynchronize the class/user grants
- Don't forget GUAOBS!

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### BANSECR - Tables and Objects

- Nine tables
- Two views
- One sequence
- Four database packages
- Three synonyms

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**BANSECR tables (9)**

- GUBIPRF - Site profile record
- GTVCLAS - class titles and last\_sync date
- GURAOBJ - all valid Banner objects, version numbers, default role to invoke
- GURUOBJ - all objects given directly to a user (not through a class)
- GTVVPDI – Contains the institution codes for your system

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**BANSECR tables (9) (cont.)**

- GURUCLS - associates Oracle UserID with Banner classes
- GURALOG - security validation log (must be TRUNCATED on occasion as it grows)
- GUBROLE - encrypted passwords for the Banner roles
- GURSPLL - history of all SQL issued by the GSASECR form

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**GURSPLL – AUDIT BANSECR**

- Besides auditing any SQL statement, you can audit the BANSECR users
- Create site-specific BANSECR users (Security manual 1-9)

```
define sys_password=manager
define sys_password=change_on_install
define bansecr_password=secret1
define baninstl_password=secret2
define u=bansecr_example
define u_password=u_pick_it
define temp_tablespace=temp
define ur=usr_gsasecr_bansecr_example
start gssacct (also runs gsspriv, gssbaag,gssysg)
start gssusrm
start gssusra
start gssroim
```
- This way, you can also audit the security officers

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**BANSECR views**

- **GUVPRV** - table permissions given to a role
- **GUVDFTR** - to show a user's default role
- **BANSECR sequence**
  - GUBOSEQ - One-up number used to sequence the records in the GURSSQL (SQL history) table

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**BANSECR database packages**

- **G\$\_SECURITY\_PKG** - procedures to verify an end-user and their access to perform object authentication
- **G\$\_AUTHORIZATION\_PKG** - security routines used for job submission, and routines to synchronize the Oracle grants with the Banner class definitions
- **G\$\_VDPI\_SECURITY** - VPD to define the home context for multiple institutions
- **G\$\_OREP\_SEC\_PKG** - Generated in support of the SunGard Higher Education security patch

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**BANSECR synonyms (3)**

- **BANINST1\_SQL\_PKG** - points to a BANINST1 owned package that is granted ONLY to BANSECR
- **G\$\_SECURITY** - public synonym for the G\$\_SECURITY\_PKG
- **G\$\_CHK\_AUTH** - public synonym for the G\$\_AUTHENTICATION\_PKG

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**Encryption**

- Banner uses a three-phase encryption process for authentication purposes
- For databases that are available on the Internet, this serves to validate that processes accessing the database are the proper processes

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**The Seed encryption numbers**

- Seed numbers are set in the database and the processes
- When the process is invoked, the database and the process exchange these seed numbers to verify authenticity
- If the seed numbers do not match, the role is not invoked

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**Seed Numbers**

- Database seed numbers are changed first
- Recompilation of all forms and programs must be done after the seed numbers are changed
- This may also have to be done if an upgrade modified any of the objects where seed numbers are stored.

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### The SEED Number Objects

- **Seed numbers are set in:**
  - The form GSASECR in Profile Maintenance
  - Pro\*C - guassed.h file
  - Pro\*COBOL- guasetr.pco file
  - Forms - goqolib.fmb - g\$\_verify\_access trigger
    - Under G\$\_VERIFY\_ACCESS, there are red arrows on four sub-items (G\$\_APPL\_FORM\_CLASS, G\$\_INQ\_FORM\_CLASS, G\$\_VAL\_FORM\_CLASS, MENU\_TYPE)
    - If you change the seed numbers in G\$\_FORM\_CLASS, the changes should cascade through the other four
    - Check to be sure that all five items have been changed

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### The SEED Number Objects (cont.)

- **Seed numbers are set in: (cont.)**
  - Graphics - goggrph.ogd
    - Under G\$\_VERIFY\_ACCESS, there are red arrows on four sub-items (G\$\_APPL\_FORM\_CLASS, G\$\_INQ\_FORM\_CLASS, G\$\_VAL\_FORM\_CLASS, MENU\_TYPE)
    - If you change the seed numbers in G\$\_FORM\_CLASS, the changes should cascade through the other four
    - Check to be sure that all five items have been changed
  - Batchsecurity.java

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End of Section

*Any Questions?*

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### Job Submission - GJAPCTL

- **Job Submission is a multi-step process**
  - User requests process in GJAPCTL Banner form
  - The form passes request through the package *dbms\_pipe* to a Pro\*C program running on the RDBMS server
    - GURJOBS

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### Job Submission – GURJOBS and GJAJOBS

- **GURJOBS**
  - Starts job submission running in the background on the RDBMS server
- **GJAJOBS**
  - This program then builds a script to execute the requested job and passes that to the Operating System
  - Requested program executes
  - Results are then:
    - Stored in the database
    - Stored on a file system
    - Printed

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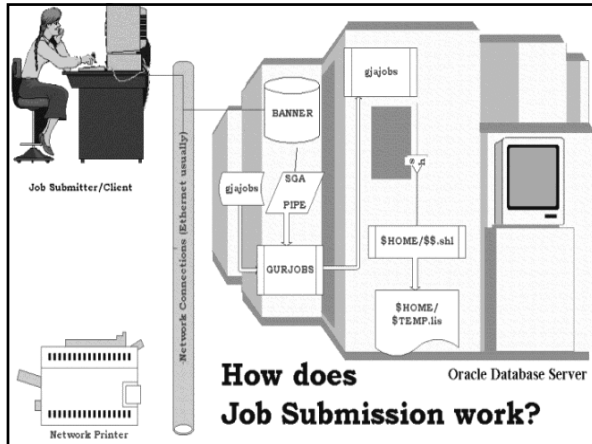
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**Job Submission - Process Types**

- There are four types of jobs that are currently supported by Banner:
  - C - Pro\*C
  - E - Pro\*COBOL (P when executed via a shell script)
  - P - Procedures (scripts)
  - R - Oracle Reports

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**Process Definition**

- Processes must be defined to Banner before they can be run
- There are several Banner forms used to define processes to Job Submission:
  - GJAJOBS - Job Definition
  - GJAPDEF - Parameter Definition
  - GJAPVAL - Parameter Values
  - GJAPDFT - Parameter Default Values
- Let's log into Banner to view the forms

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**Parameter Definition**

- These parameters must be accounted for in the Job Submission parameter handling routines of the process
- Defaults can be set in Banner and/or in the program logic

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**Printer Definition**

- Printers must be defined to the O/S
- GTVPRNT is a separate form for configuring the print handling
- GTVPRNT must be populated before printers can be referenced
  - Define Printer port
  - Define landscape printer codes
  - Define portrait printer codes

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**Job Submission - The Process**

- This process is different on every platform
- Operating System and Network requirements may make modification of Job Submission processes mandatory
- Job Submission uses the GUBINST table to determine OS specifics that must be built into the job stream.  
(GUAINST form displays GUBINST data)

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**User View**

- Job Submission begins in the GJAPCTL form
- Process is validated
- Process parameters are inserted into the process run parameters table GJBPRUN using the GJBPSEQ sequence
- GJAPCTL then performs a call form to GUQINTF, the Job Submission Interface Form

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**Technical View - 1**

- GUQINTF determines that request came from Job Submission
- GUQINTF fires JS\_HOST\_COMMANDS trigger to build a command string to pass to GURJOBS
- The command contains the O/S command to start the gjajobs script and eight parameters

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**Technical View - 2**

- GUQINTF then fires the PIPEIT form level trigger
- PIPEIT uses DBMS\_PIPE.SEND\_MESSAGE to send the command to GURJOBS, executing on the RDBMS server
- GJAPCTL status line is updated, showing Job Submission name and sequence number
- GURJOBS initiates GJAJOBS.SHL file, using the SYSTEM function to start it

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### GJAJOBS Parameters

- GJAJOBS.SHL reads the parameters passed to it by GURJOBS and builds a temporary shell file to execute it
- Parameters:
  - #1 is the process name
  - #2 is the process type
  - #3 is the user ID
  - #4 is the password
  - #5 is the one up number
  - #6 is the printer name
  - #7 is the form name
  - #8 is the submit time

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### Process execution

- TEMP.SHL file executes where the process picks up the program parameters from GJBPRUN based on the sequence number
- GJAJOBS.SHL determines from the PRNT variable if output is to be stored in the database
- If it is, then the GURINSO process is invoked to insert the data into the database
- Otherwise, DEFAULT\_PRINTER and LOCAL\_DIRECTORY determine output placement in the form GJAJPRF

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### Windows – SCTBAN.PM

- Perl script used with printing
  - Read before printing starts
  - Can set up individual printers
- ```
if ($sctban_osname eq "WNT")
{
    if (uc($sctban_form) eq "HPP17")
    {
        open(PRNT, "|nt_print ${sctban_printer_name}
HPP17.frm ${sctban_file_name}.lis > temp.lst");
    }
}
```
- The HPP17.frm is a printer specific code file (HP – PCL)

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**Output Destination**

- When submitting the job, the user can specify the destination
- If the destination is not defined, the default printer for the job is used
- DATABASE option can be specified to have the output placed in the database
  - GUBOUTP
  - GUROUTP

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**Reviewing The Output Online**

- After the output is placed in the database, it can be reviewed using the GJIREVO form
- User then has the option of saving the file locally or printing it
- User is also “supposed” to delete it when finished

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**The *jobsub* user**

- A UNIX user ID
- Part of the banner user group
- Used to start/stop the GURJOBS process
- A good idea is to have a separate subdirectory for each database

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### GURJOBS Startup and Shutdown

- The GURJOBS process must be run from the OS level
- It is submitted to UNIX via the nohup command:  

```
— nohup sh $BANNER_LINKS/gurjobs.shl  
    userid/password >jobsSID.log 2>&1 &
```
- GURSTOP.SQL is submitted from SQL\*PLUS to stop GURJOBS

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### GURJOBS Startup and Shutdown

- On Windows machines, it can be run two ways
  - As a service
    - Easy for anyone to start
    - Uses a local user with a parameter of the batch job
    - Refer to the workbook and FAQ#2018
  - As a batch job
    - Must set environments to be sure it is being run in the correct database
    - Then run the job
    - Refer to FAQ#2030

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### Starting GURJOBS

- start\_gurjobs

```
ORAENV_ASK=NO; export ORAENV_ASK  
ORACLE_SID=$1; export ORACLE_SID  
PATH=/usr/local/bin:$PATH; export PATH  
./usr/local/bin/oraenv  
#  
nohup $BANNER_LINKS/gurjobs.shl SEED GURJOBS >  
start${ORACLE_SID}job.log 2>&1 &
```
- To start the GURJOBS process for the SEED database:

```
sh start_gurjobs SEED
```

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### Stopping GURJOBS

- The GURJOBS process must be stopped from SQLPLUS
- It is submitted to SQLPLUS through a Unix script
- It is a SQLPLUS script
  - GURSTOP.SQL
- GURJOBS automatically stops after four days with no activity

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### Job Submission - Startup and Shutdown

- **stop\_gurjobs**

```
ORAENV_ASK=NO; export ORAENV_ASK
ORACLE_SID=$1; export ORACLE_SID
PATH=/usr/local/bin:$PATH; export PATH
. /usr/local/bin/oraenv
#
sqlplus -s genlprd/u_pick_it @gurstop>
stop${ORACLE_SID}job.log 2>&1
```
- **To run the stop\_gurjobs script for the SEED database**

```
sh stop_gurjobs SEED
```

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### Job Submission - Cleanup

- One must set up scripts to automatically cleanup the various jobsub directories
- If centralized, output cleanup is easier
- If output is routed to the user's directories, cleanup is more difficult
- Must also clean up the database tables
  - GUBOUTP
  - GUROUTP

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**Summary/Review Objectives**

- Resize tables
- Create a production database
- Configure a database
- Export and import data
- Create a backup strategy
- Locate Banner source code
- Apply a Banner upgrade
- Apply Banner security to users and site-created source code

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**End of Section**

*Any Questions?*

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**BANNER** HIGHER EDUCATION

*Thank you for your participation.*

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