

SFSU Finance BI Implementation Case Study



December 5th 2008

- ❖ Introduction
- ❖ SFSU BI Implementation Project Overview
 - Mission
 - Current Reporting Solution - Improvement Areas
 - Challenges
 - Solution
 - Architecture
 - Methodology
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Presenters:

1. Sudeep Badjatia

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Technical Architect and Project Manager

eTouch Systems: Consulting partner for SFSU BI Implementation

2. Sergey Bloom

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SFSU BI Analyst

- Enable enterprise wide integrated Business Intelligence solution
- Implement Dashboards, Ad Hoc Reporting, Transactional Reporting, Metadata Management and detailed HR, Finance and Student metrics using OLAP, ETL and integrated Data warehouse solution.
- Integrate Object and Data level Security with LDAP Directory, Single Sign On and Portal integration.

Current Reporting Solution - Improvement Areas



- Performance
- Resource usage
- Information integration
- Interpretation and analysis
- Trend Analysis
- Drill Downs and Graphical User Interface
- Authentication and authorization schemes
- Integration with SSO and Enterprise Portal

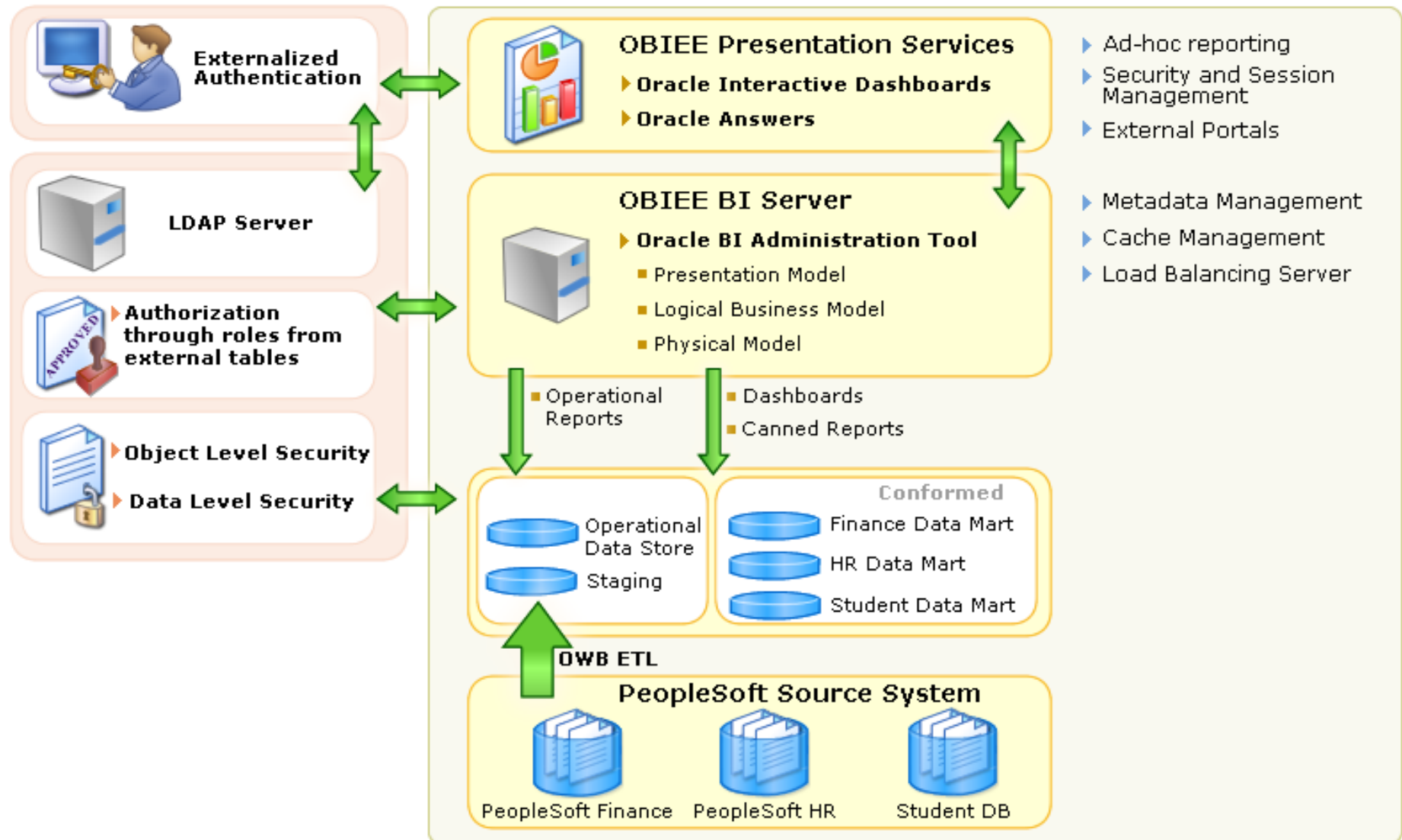
Challenges specific to BI Implementation



- Organizational awareness
- Project Management
- Training
- Roles and Responsibilities (RACI) across teams
- Processes and Methodologies
- Hardware and Software Evaluation, Installation, Configuration
- Performance Engineering
- Budget constraints

- Complete Project Management
- Phased deployment approach
- Adaption of Enterprise Data Bus Architecture
- Operational Data Store solution Proposed for Transactional reporting
- Implementation of Best Practices on OBIEE, OWB, Dimension Modeling
- Train and leverage SFSU Finance, IT and Infra Teams
- Proactive measures taken on performance bottlenecks
- Deliver Templates and Reusable code
- Leverage Agile development methodology

SFSU Data Warehouse Overall Architecture



DW Methodology - Enterprise Data Bus Architecture



Business Process	Measurement Name	Common Dimension Process Dimension												
		Time	Business Unit	Vendor / Emp/ Studen	Account	Fund	Department	Project	Class	Program	Req	PO	Voucher	Journal
Pre-Encumbrance Document Details	Transactional Pre-Encumbrance Amount	X	X	X	X	X	X	X	X	X	X	X	X	X
Encumbrance Document Details	Transactional Encumbrance Amount	X	X	X	X	X	X	X	X	X		X	X	X
Actuals Document Details	Transactional Actual Amount	X	X		X	X	X	X	X	X			X	X
Original Budgets	Transactional Budget Amount (Original : INITL_BUD)	X	X		X	X	X	X	X	X				X
Revised Budget	Transactional Budget Amount (Revised: PTD)	X	X		X	X	X	X	X	X				X
Revised Budget for General Funds	Transactional Budget Amount (CURRNT_BUD)	X	X		X	X	X	X	X	X				X
Actuals Ledger summary by chartfields, accounting period, business unit	MTD (Current) Actual Amount	X	X		X	X	X	X	X	X				
Actuals Ledger summary by chartfields, accounting period, business unit	YTD Actual Amount (Year to Date Actual)	X	X		X	X	X	X	X	X				
KK Ledger summary by chartfields per business unit	PTD Pre-Encumbrance Amount	X	X		X	X	X	X	X	X				
KK Ledger summary by chartfields per business unit	PTD Encumbrance Amount	X	X		X	X	X	X	X	X				
Actuals Ledger summary by chartfields per business unit	PTD Actual Amount	X	X		X	X	X	X	X	X				
Ledger Summary for General Fund	Budget-(YTD+Pre+Enc) Available Balance	X	X		X	X	X	X	X	X				
Ledger Summary for Grants Fund	Budget-(PTD+Pre+Enc) Available Balance	X	X		X	X	X	X	X	X				
Ledger Summary for Trusts Fund	Budget-(YTD+Pre+Enc) Available Balance	X	X		X	X	X	X	X	X				
Ledger Summary for Revenue Fund	Budget-(YTD+Pre+Enc) Available Balance	X	X		X	X	X	X	X	X				
Across Fund Types calculates measure	% Available (changed from % Used) - Not for Trusts	X	X		X	X	X	X	X	X				
Across Fund Types calculates measure	Commitments (PTD Pre + PTD Enc)	X	X		X	X	X	X	X	X				
Project related Direct Cost	Direct \$ Available	X	X		X	X	X	X	X	X				X
Project related InDirect Cost	Indirect \$ Available	X	X		X	X	X	X	X	X				X

* **Sample Kimball Metrics**

Demo on SFSU Finance BI Implementation



Security

- LDAP Authentication
- Role Based Authorization Model
- Object Level
 - Dashboards
 - Display Tabs
 - Default Landing Dashboard
- Data Level
 - Access restricted on Department and Project IDs
 - Prompt Values

Dashboards

- General Fund Dashboard
 - Expenditure Reports with Drill downs based on Department hierarchy
 - Expenditure Reports with Drill downs based on Account hierarchy
 - Document Budgets, Actual, Encumbrances, Pre-Encumbrances Report
- Trust Funds and ORSP Dashboard
 - Available Balance by Project
 - Account level Summary and Detail by Account ID
 - Payroll Report by Employee
 - Operating Expenses Report

Physical Layer

- Eliminate all Circular Joins that either cross dimensions or are contained within a single dimension. Use Physical Layer table Aliases to duplicate certain tables and modify joins so that the Circular Join is removed. (Should have 1 less join than there are tables in physical SQL generated)
- Do not include filters in the Physical layer when creating joins - instead build them into the Business Model on the Logical Tables Sources
- Never model Fact-to-Fact Joins. The proper modeling technique is to let analytics choose more than one fact table in a sub query, and let the Analytics Server or the Database join the result set. (Drill Across scenarios)
- Cross database joins should not exist. (Performance Issues)
- Make all tables “cacheable.” Set cache persistence time as “infinite” and utilize polling tables for refreshes

Business Model Layer

- Only use 1:M complex joins between Logical Dimension Tables and the Facts. FK Joins limits the flexibility and power of the SQL generation engine.
- Identify the base granularity of a logical table, both Dimension and Fact. Only add physical tables to the logical table source (LTS) that are at the same or higher levels of granularity
- Ensure that all levels of a hierarchy have an appropriate value for the Number of elements field. This will enable the Analytics server to select the most optimal pre-aggregated fact tables to use
- Avoid outer joins within LTS as they are always included in the query, even if it is not used. If necessary, create one LTS without the Outer Join and another with the Outer Join. Order the Outer Join LTS after the Non Outer Join so that it will be used only when necessary.
- Always verify the SQL generated is correct.

Presentation Layer

- Ensure that aliases for Presentation layer columns and tables are not used. Aliases are useful when making changes to a production system, but for a first time deployment should be removed.
- Structure Presentation Catalog around the Facts. Make sure that only the dimensions supported by the Facts are part of the Presentation Catalog
- Avoid technical labels in the presentation Layer.

General

- Minimize number of Initialization blocks. Combine where possible
- Only use Logging level > 0 during development and debugging
- Move as much of the query logic to the ETL as possible to improve system response time. Pre-calculation of additive metrics and attributes will reduce query complexity and therefore response time
- Denormalize dimensions and Fact table FKs as much as possible to reduce joins
- Try to eliminate all outer joins in a Data Warehouse by doing ETL lookups and replacing with default (commonly 'Unknown') parents. This will simplify the Business Layer, ensure a consistent record set, and improve performance
- Design Business Model Layer to support ad-hoc reporting instead of catering to specific reports. This will enable end users to perform their own analysis and create their own reports as needed

**Screenshots of the Demo for offline
reference**

SFSU Finance BI Implementation: Screenshots

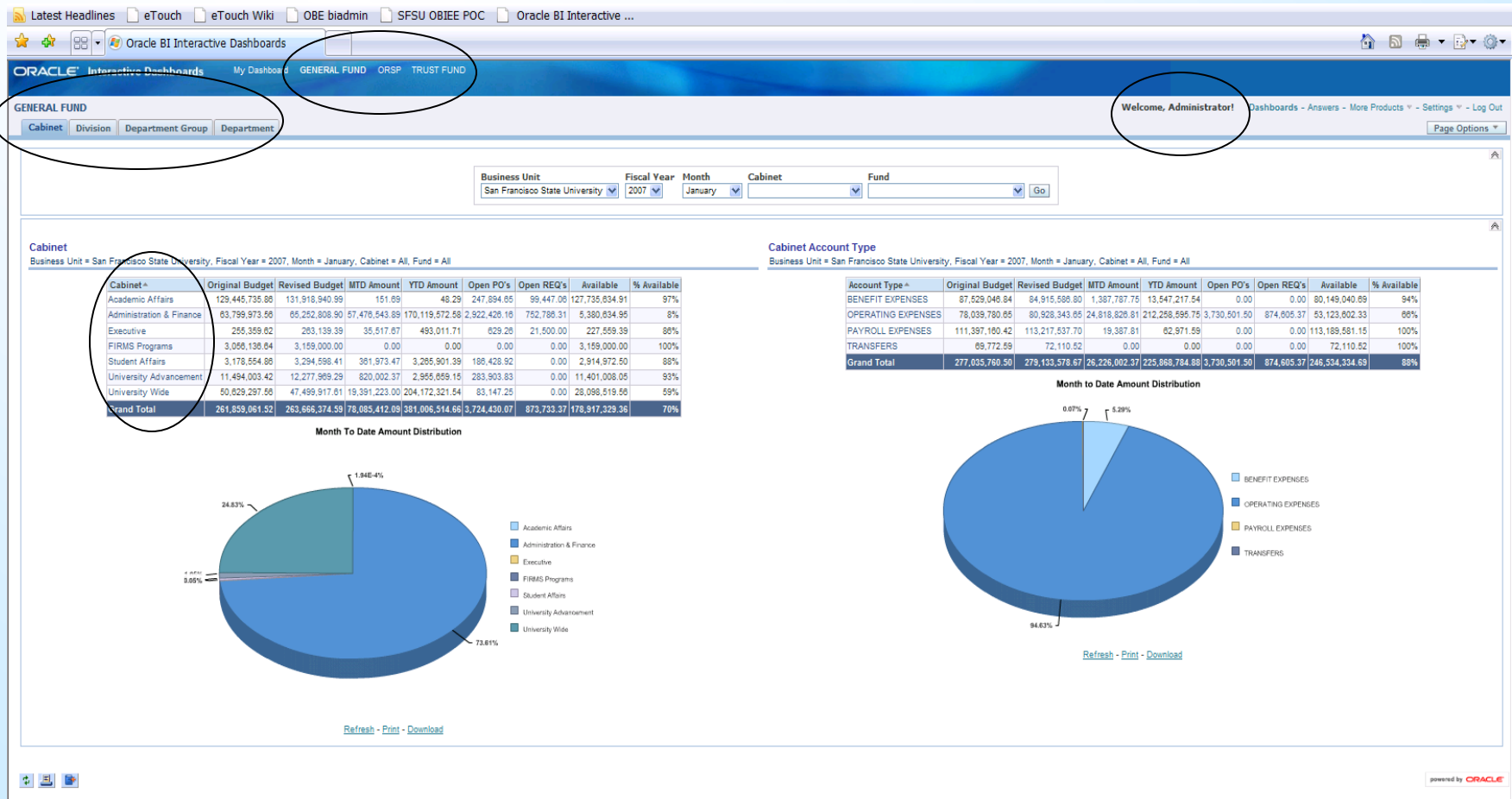


Login: Administrator

Dashboards visible: All (General Fund, Grants, Trust)

Default Landing page: Cabinet Tab in General Fund Dashboard based on User Role

Drill Downs: Department (Cabinet->Division->Department Group->Department); Account Hierarchies (Account Type->Account Group (Level 2 & 3)->Account IDs . Chart is drillable



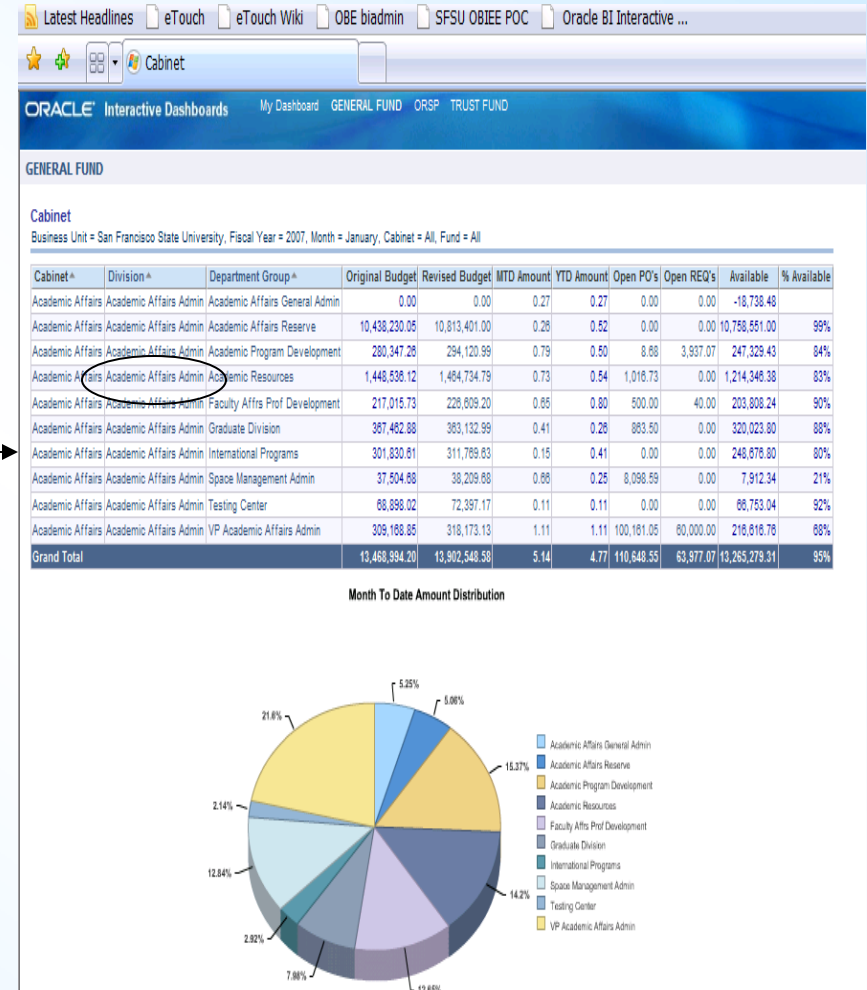
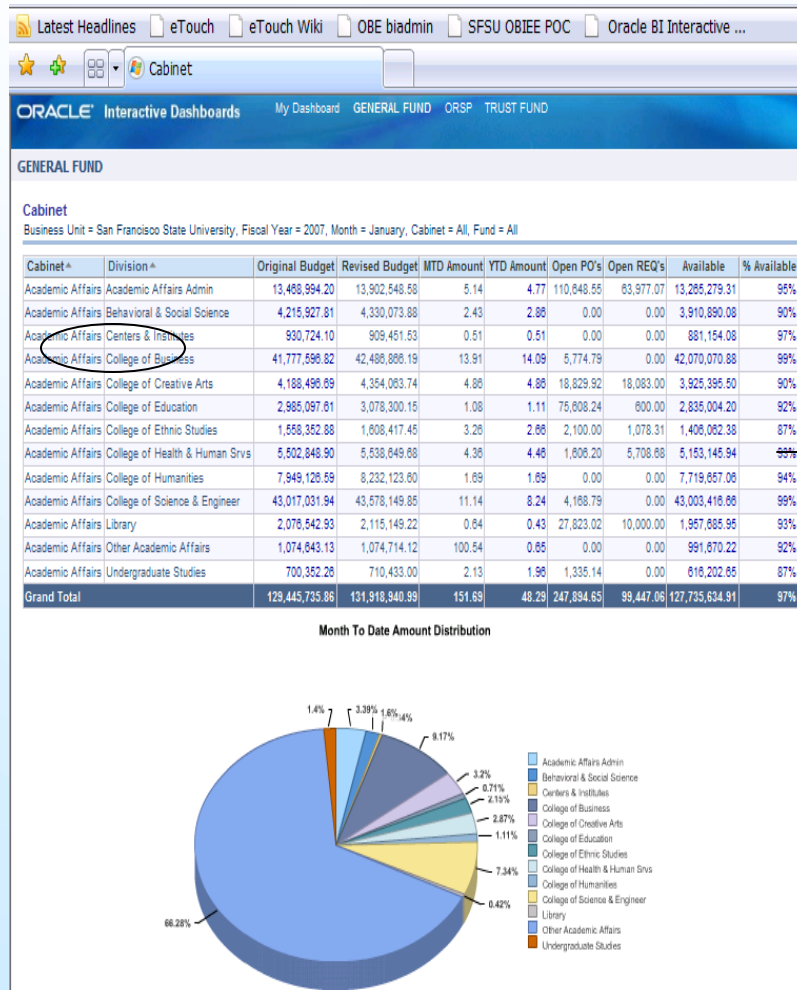
SFSU Finance BI Implementation: Screenshots



Login: Administrator

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SFSU Finance BI Implementation: Screenshots

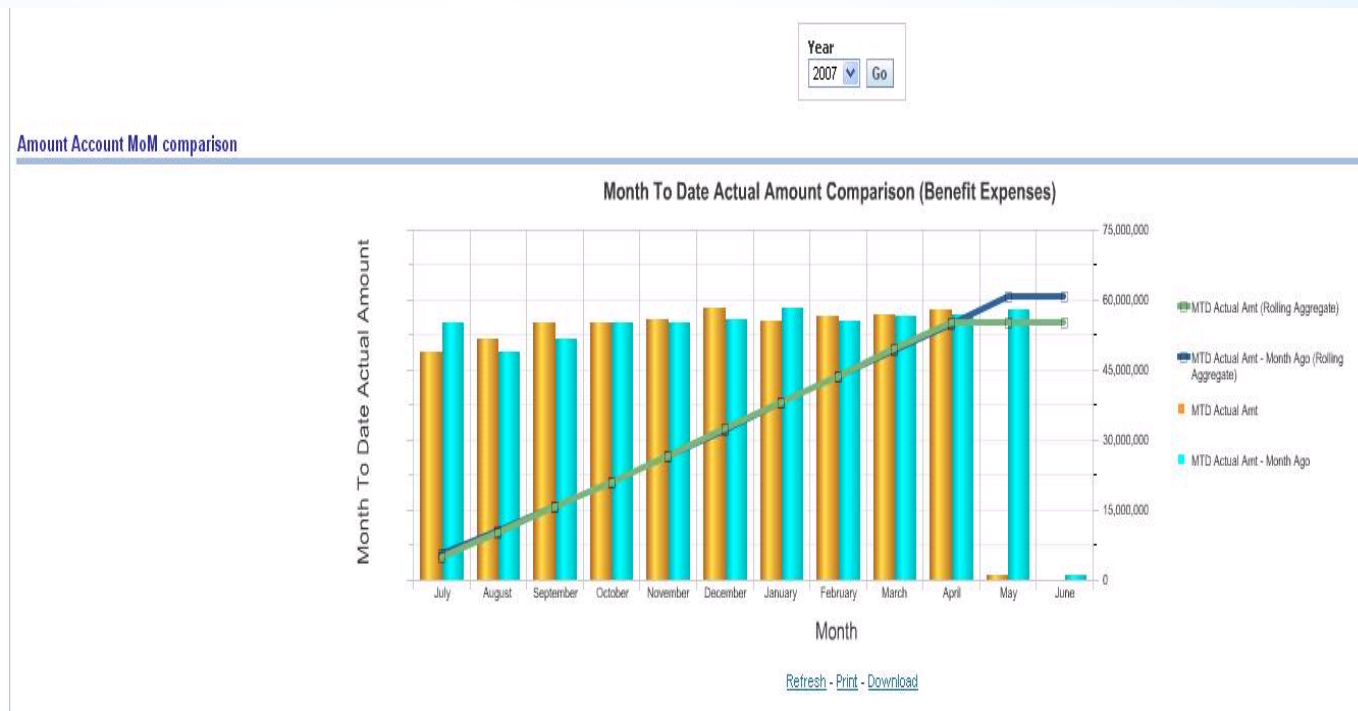


Login: Administrator

Data Security: None

Prompt Values: All Visible

Focus: Month over Month Comparison Chart for Actual Expenses (Drillable)



SFSU Finance BI Implementation: Screenshots



Login: Administrator
Data Security: None
Prompt Values: All Visible

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Oracle BI Interactive Dashboards

ORACLE Interactive Dashboards My Dashboard GENERAL FUND CRSP TRUST FUND

Welcome, Administrator! Dashboards - Answers - More Products - Settings - Log Out

GENERAL FUND

Cabinet Division Department Group Department

Business Unit Fiscal Year Month Cabinet Fund

San Francisco State University 2007 January

(All Choices)
Academic Affairs
Administration & Finance
Executive
FIRMS Programs
Student Affairs
University Advancement
University Wide

Cabinet

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Cabinet = All, Fund = All

Cabinet*	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
Academic Affairs	129,445,735.88	131,918,940.99	151.89	48.29	247,894.85	99,447.06	127,735,834.91	97%
Administration & Finance	83,799,973.58	85,252,808.90	57,478,543.89	170,119,572.58	2,922,428.16	752,768.31	5,380,834.95	8%
Executive	255,359.82	283,138.39	35,517.67	493,011.71	629.26	21,500.00	227,559.39	88%
FIRMS Programs	3,058,136.84	3,159,000.00	0.00	0.00	0.00	0.00	3,159,000.00	100%
Student Affairs	3,178,554.86	3,294,598.41	381,973.47	3,285,901.39	186,428.92	0.00	2,914,972.50	88%
University Advancement	11,494,003.42	12,277,969.29	820,002.37	2,965,659.15	283,903.83	0.00	11,401,008.05	93%
University Wide	50,629,297.56	47,499,917.81	19,391,223.00	204,172,321.54	83,147.25	0.00	28,098,519.56	59%
Grand Total	261,859,061.52	263,666,374.59	78,085,412.09	381,006,514.66	3,724,430.07	873,733.37	178,917,329.36	70%

Account Type*

Account Type*	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
BENEFIT EXPENSES	87,529,048.84	84,915,588.80	1,387,787.75	13,547,217.54	0.00	0.00	80,149,040.89	94%
OPERATING EXPENSES	78,039,780.85	80,928,343.65	24,818,828.81	212,258,595.75	3,730,501.50	874,605.37	63,123,802.33	68%
PAYROLL EXPENSES	111,397,180.42	113,217,537.70	19,387.81	62,971.59	0.00	0.00	113,189,581.15	100%
TRANSFERS	69,772.59	72,110.52	0.00	0.00	0.00	0.00	72,110.52	100%
Grand Total	277,035,760.50	279,133,578.67	26,226,002.37	225,868,784.88	3,730,501.50	874,605.37	246,534,334.69	88%

SFSU Finance BI Implementation: Screenshots



Login: **Test User 1** who has access only to a particular Department under General Fund

Dashboards visible: Only General Fund based on Security Role access

Default Landing page: Department Tab in General Fund Dashboard. Other Tabs are not visible

Drill Downs: Account Hierarchy (Account Type->Account Group (Level 2 & 3)->Account IDs

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Oracle BI Interactive Dashboards

ORACLE Interactive Dashboards My Dashboard GENERAL FUND

GENERAL FUND

Welcome, T00000001! Dashboards - Answers - More Products * - My Account - Log Out

Page Options

Business Unit: San Francisco State University Fiscal Year: 2007 Month: January Department: Fund: Go

Department

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department = All, Fund = All

Department	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
Research & Sponsored Prog	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%
Grand Total	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%

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Department Account Type

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department = All, Fund = All

Account Type	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
BENEFIT EXPENSES	657,718.93	542,298.96			0.00	0.00	482,043.52	89%
PAYROLL EXPENSES	380,143.92	388,368.00	100.00	0.11	0.00	0.00	388,368.00	100%
Grand Total	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%

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Department

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GENERAL FUND

Department

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department = All, Fund = All

Department	ACCOUNT_DESCR	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
Research & Sponsored Prog	Dental Insurance	18,509.95	19,950.95			0.00	0.00	15,076.32	89%
Research & Sponsored Prog	Flexcash	2,207.15	2,412.00			0.00	0.00	2,144.00	89%
Research & Sponsored Prog	Health And Welfare	189,628.34	173,910.96			0.00	0.00	154,687.52	89%
Research & Sponsored Prog	Life Insurance	829.49	841.08			0.00	0.00	748.16	89%
Research & Sponsored Prog	Long-Term Disability	144.08	132.57			0.00	0.00	117.84	89%
Research & Sponsored Prog	Medicare	21,897.28	20,933.54			0.00	0.00	18,007.68	89%
Research & Sponsored Prog	O.A.S.D.I.	87,270.21	87,915.69			0.00	0.00	78,147.28	89%
Research & Sponsored Prog	Retirement	234,696.93	236,726.46			0.00	0.00	210,423.52	89%
Research & Sponsored Prog	Support Staff Salary	380,143.92	388,368.00	100.00	0.11	0.00	0.00	388,368.00	100%
Research & Sponsored Prog	Vision Care	2,333.90	2,405.10			0.00	0.00	2,191.20	89%
Grand Total		937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%

Return - Refresh - Print - Download - Create Bookmark Link

Drill Down to various
Accounts under Research
Department

SFSU Finance BI Implementation: Screenshots



Login: Test User 1 who has access only to a particular Department under General Fund

Prompts: Filled with values based on Data Level Security (Test User has access only to Research Department)

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Oracle BI Interactive Dashboards

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GENERAL FUND Welcome, T00000001! Dashboards - Answers - More Products - My Account - Log Out

Page Options

Business Unit: San Francisco State University Fiscal Year: 2007 Month: January Department: (All Choices) Fund: Research & Sponsored Prog

Department

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department = All, Fund = All

Department	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
Research & Sponsored Prog	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%
Grand Total	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%

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Department Account Type

Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department = All, Fund = All

Account Type	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
BENEFIT EXPENSES	557,716.93	542,296.96			0.00	0.00	482,043.52	89%
PAYROLL EXPENSES	380,143.92	388,368.00	100.00	0.11	0.00	0.00	388,368.00	100%
Grand Total	937,860.85	930,666.96	100.00	0.11	0.00	0.00	870,411.52	94%

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SFSU Finance BI Implementation: Screenshots



Login: Test User 2 has access to all Fund Dashboards, but has access only to a single Department Group under General Fund

Dashboards visible: All Dashboards

Default Landing page: Department Group Tab in General Fund Dashboard. Other Tabs are disabled

Drill Downs: Hierarchies (Department Group-> Department; and Account Type->Account Group (Level 2 & 3)->Account IDs

Prompts: Filled with values based on Data Level Security (Test User has access to a particular Department Group)

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Welcome, T00000002! Dashboards - Answers - More Products - My Account - Log Out

Page Options

Business Unit: San Francisco State University Fiscal Year: 2007 Month: January Department Group: Fund: Go

Department Group
Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department Group = All, Fund = All

Department Group	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
Undergraduate Studies Admin	572,387.84	578,066.76	1.86	1.89	1,304.76	0.00	518,822.41	90%
Grand Total	572,387.84	578,066.76	1.86	1.89	1,304.76	0.00	518,822.41	90%

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Department Group Account Type
Business Unit = San Francisco State University, Fiscal Year = 2007, Month = January, Department Group = All, Fund = All

Account Type	Original Budget	Revised Budget	MTD Amount	YTD Amount	Open PO's	Open REQ's	Available	% Available
BENEFIT EXPENSES	428,922.27	438,107.76			0.00	0.00	388,381.34	88%
OPERATING EXPENSES	7,830.40	7,983.00	0.32	0.45	1,304.76	0.00	3,918.89	49%
PAYROLL EXPENSES	136,835.17	131,976.00	0.18	0.18	0.00	0.00	131,976.00	100%
Grand Total	572,387.84	578,066.76	0.50	0.53	1,304.76	0.00	522,254.23	90%

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SFSU Finance BI Implementation: Screenshots



Login: Test User 2 who has access to all Fund Dashboard, but has access only to a single Department Group under General Fund

Trust Fund Dashboard: Data Level security is based on the Projects the User has access to

Drill Downs: Project Hierarchy

Prompts: Filled with values based on Data Level Security (Test User has access to specific projects)

Oracle BI Interactive Dashboards

My Dashboard GENERAL FUND ORSP TRUST FUND

TRUST FUND

Overview Account Group Summary

Welcome, T00000002! Dashboards - Answers - More Products - My Account - Log Out

Page Options

Business Unit: San Francisco State University Fiscal Year: Month: Project: Trust Fund: Balance: Go

Project Summary

Project	Description	Start Date	End Date	MTD Amount	YTD Amount	Project Status
20027542	RIMI Cost Sharing Compn 05-06	9/30/2005	9/29/2006	16.06		
20033310	Youth: Training Curr for CWS	9/30/2005	9/29/2006	1.28		
20037530	Mano-U*Star Program-Yr6	8/1/2003	5/31/2004	0.96	3.44	
20041312	Comp-516 Sfsu/Cosf Bridges	9/1/2003	8/31/2004	11.44	12.24	
20041861	CCSF & SFSU Bridges to the BAC	9/1/2004	8/31/2006	1.04	1.04	
20041862	Cost Share Comp-Bridges to BAC	9/1/2004	8/31/2006		0.00	
20043332	Diaz Companion Acct	7/1/2003	6/30/2004	28.04	31.84	
20043332	Cs Comp-513(Misp-Consoli)	7/1/2003	6/30/2004		2.40	
20045332	Comp-521 (Misp-Juang)	7/1/2003	6/30/2004	2.40	5.04	
20046332	SP-CS Comp-527(M-Risp/Kim-Yr3)	7/1/2003	6/30/2004		3.52	
20046542	CS Comp-538 (Cor)	7/1/2003	6/30/2004	12.48	15.52	
20062522	CS-Rim#2 (Faculty/Wiley)-Yr2	9/30/2004	9/29/2005	14.88	18.40	
20063512	Comp-508 (Rim2)	9/30/2003	9/29/2004	5.80	5.80	
20063522	CS-Rim#2/Wilfred Denetolaw-Y2	9/30/2004	9/29/2005		0.00	
20080420	MBRS Score/Spicer	1/1/2004	12/31/2004		3.68	
20094540	U56-Holding Account Yr 4	7/1/2005	6/30/2006		3.28	
20094550	U56 - Master Account YR 5	7/1/2006	6/30/2008		3.84	
20095040	U56-Planning and Evaluatn-Yr 4	7/1/2005	6/30/2006	3.28	8.48	
20095050	U56 - Planning & Evaluation YR	7/1/2006	6/30/2008	4.08	8.80	
20101552	Cost Sharing for NIH/COR Pgm	7/1/2004	6/30/2005	7.20	7.20	
20103512	Cost Sharing Comp (M-Risp/Diaz	7/1/2004	7/1/2007	14.48	16.32	
20104512	Cost Sharing (MRisp/Alvarez)	9/13/2004	7/1/2007	2.96	8.80	
20104522	C/S Companion Acct-20104521	8/1/2005	5/31/2006		0.00	
20105512	Cost Sharing (MRisp/Williams)	9/13/2004	7/1/2007		3.68	
50006110	Capl-Cpdl Reading Institute	1/1/2002	6/30/2003		0.00	

Records 1 - 25

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Object Level Security: Payroll and Vendor Summary reports visible based on the User having access to these reports



Thank You