

IBM Tivoli Business Systems Manager Warehouse Enablement Pack V2.1.1 Implementation Guide

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Edition notice

First Edition

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1 About this document

This document describes the warehouse enablement pack for IBM® Tivoli® Business Systems Manager V2.1.1 with patch 1. It covers the following topics:

- Installing and configuring the warehouse pack
- The data flow and data structures used by the warehouse pack

With this warehouse pack, you can enable a set of extract, transform, and load (ETL) utilities to extract and move data from Tivoli Business Systems Manager data stores to a central Tivoli Enterprise™ Data Warehouse database. Administrators and programmers require the type of information provided in this document to install the ETL tools and understand what data is being populated in the central data warehouse during what is referred to as the *central data warehouse ETL*. The current Tivoli Business Systems Manager warehouse pack only handles Business Systems resources in the Tivoli Business Systems Manager database. “Business Systems” was referred to as “LOB” or “Line of Business” in the early version of Tivoli Business Systems Manager.

1.1 Related documentation

You can access many Tivoli publications online using the Tivoli Information Center, which is available on the Tivoli Customer Support Web site:

<http://www.ibm.com/support/documents/>

The following Tivoli Enterprise Data Warehouse documents are available on the Tivoli Enterprise Data Warehouse Documentation CD:

- *Tivoli Enterprise Data Warehouse Release Notes*, GI11-0857
Provides late-breaking information about Tivoli Enterprise Data Warehouse and lists hardware requirements and software prerequisites.
- *Installing and Configuring Tivoli Enterprise Data Warehouse*, GC32-0744
Describes how Tivoli Enterprise Data Warehouse fits into your enterprise, explains how to plan for its deployment, and gives installation and configuration instructions. It provides an introduction to the built-in program for creating and running reports, and contains maintenance procedures and troubleshooting information.
- *Enabling an Application for Tivoli Enterprise Data Warehouse*, GC32-0745
Provides information about connecting an application to Tivoli Enterprise Data Warehouse. This book is for application programmers who use Tivoli Enterprise Data Warehouse to store and report on their application's data, data warehousing experts who import Tivoli Enterprise Data Warehouse data into business intelligence applications, and customers who use their local data in the warehouse.

The DB2® library contains important information about the database and data warehousing technology provided by IBM DB2, DB2 Data Warehouse Center, and DB2 Warehouse Manager. Refer to the DB2 library for help in installing, configuring, administering, and troubleshooting DB2. The DB2 library is available on the Tivoli Customer Support Web site. After you install DB2, its library is also available on your system.

The following DB2 documents are particularly relevant for people working with Tivoli Enterprise Data Warehouse:

- *IBM DB2 Universal Database for Windows Quick Beginnings*, GC09-2971
Guides you through the planning, installation, migration (if necessary), and setup of a partitioned database system using the IBM DB2 product on Microsoft® Windows®.
- *IBM DB2 Universal Database for UNIX Quick Beginnings*, GC09-2970
Guides you through the planning, installation, migration (if necessary), and setup of a partitioned database system using the IBM DB2 product on UNIX®.
- *IBM DB2 Universal Database Administration Guide: Implementation*, SC09-2944

Covers the details of implementing your database design. Topics include creating and altering a database, database security, database recovery, and administration using the Control Center, a DB2 graphical user interface.

- *IBM DB2 Universal Database Data Warehouse Center Administration Guide*, SC26-9993

Provides information about how to build and maintain a data warehouse using the Data Warehouse Center.

- *IBM DB2 Warehouse Manager Installation Guide*, GC26-9998

Provides the information to install the following Warehouse Manager components: Information Catalog Manager, warehouse agents, and warehouse transformers.

- *IBM DB2 Universal Database and DB2 Connect Installation and Configuration Supplement*, GC09-2957

Provides advanced installation considerations and guides you through the planning, installation, migration (if necessary), and set up a platform-specific DB2 client. Once the DB2 client is installed, you then configure communications for both the client and server, using the DB2 GUI tools or the Command Line Processor. This supplement also contains information on binding, setting up communications on the server, the DB2 GUI tools, DRDA® AS, distributed installation, the configuration of distributed requests, and accessing heterogeneous data sources.

- *IBM DB2 Universal Database Message Reference Volume 1*, GC09-2978 and *IBM DB2 Universal Database Message Reference Volume 2*, GC09-2979

Provides a list of the messages and codes issued by DB2, the Information Catalog Manager, and the Data Warehouse Center, and describes the actions you should take.

2 Overview

The following sections provide an overview of Tivoli Enterprise Data Warehouse and the Tivoli Business Systems Manager warehouse pack.

2.1 Overview of Tivoli Enterprise Data Warehouse

Tivoli Enterprise Data Warehouse provides the infrastructure for the following:

- Extract, transform, and load (ETL) processes through the IBM DB2 Data Warehouse Center tool
- Schema generation of the central data warehouse
- Report interfaces

As shown in Figure 1, Tivoli Enterprise Data Warehouse consists of a centralized data store where historical data from many management applications can be stored, aggregated, and correlated.

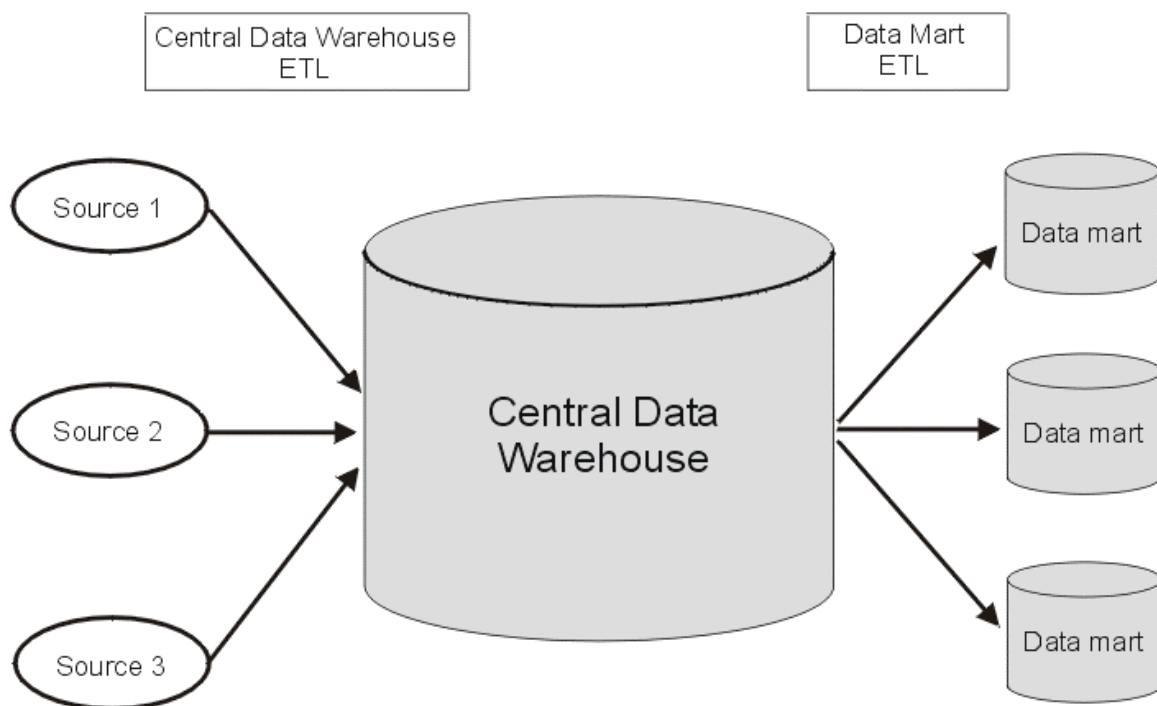


Figure 1. Tivoli Enterprise Data Warehouse overview

The *central data warehouse* uses a generic schema. As new components or new applications are added, more data is added to the database; however, no new tables or columns are added in the schema.

A *data mart* is a subset of a data warehouse that contains data tailored and optimized for the specific reporting needs of a department or team.

The *central data warehouse ETL* reads the data from the operational data stores of the application that collects it, verifies the data, makes the data conform to the schema, and places the data into the central data warehouse.

The *data mart ETL* extracts a subset of data from the central data warehouse, transforms it, and loads it into one or more star schemas, which can be included in data marts to answer specific business questions.

A program that provides these ETLs is called a *warehouse enablement pack*, or *warehouse pack*.

2.2 Overview of Tivoli Business Systems Manager warehouse pack

The Tivoli Business Systems Manager warehouse pack enables a set of extract, transform, and load (ETL) utilities to extract and move data from Tivoli Business Systems Manager data stores to a central data warehouse database in Tivoli Enterprise Data Warehouse. Currently the Tivoli Business Systems Manager warehouse pack only extracts some information of Business Systems resources. It includes resource creation, deletion, renaming, and alert state changes.

When the Tivoli Business Systems Manager ETL runs for the first time, it performs the initialization step using the settings in TWG.Prune_Msmt_Control table. All Business Systems resources in the Tivoli Business Systems Manager database are created in the Tivoli Enterprise Data Warehouse database. The previous historical alert state percentage data for the Business Systems resources are transferred into the Tivoli Enterprise Data Warehouse database. The TWG.Prune_Msmt_Control warehouse table in the data warehouse determines the amount of the previous historical alert state percentage data that is retained in the Tivoli Enterprise Data Warehouse. By default, the Tivoli Business Systems Manager ETL is set up to retain data for one year. After the initialization step, the Tivoli Business Systems Manager ETL processes incremental data. It only captures the resource creation, deletion, renaming, and alert state changes on the Business Systems resources.

This next section describes the steps that are performed in **GTM_c05_LOBState_Process** of GTM_Tivoli_Business_Systems_Manager_V2.1.1_Subject_Area. This process loads the Business Systems resources and their state percentage data from the Tivoli Business Systems Manager database into Tivoli Enterprise Data Warehouse database.

The ETL process is required by the Tivoli Enterprise Data Warehouse for applications willing to make their data available in the Tivoli Enterprise Data Warehouse database. The whole ETL process comprises the extraction of Tivoli Business Systems Manager data from the local Tivoli Business Systems Manager source tables, the transformation of such data through calculations, and the storage of the resulting data into the Tivoli Enterprise Data Warehouse central data warehouse target tables. The figures also introduce the type of data and measurements that will be stored in the central data warehouse target tables by the Tivoli Business Systems Manager ETL, as well as identify which tasks are part of Tivoli Business Systems Manager and which are part of the Tivoli Business Systems Manager ETL process. The following four figures present a high-level view of the Tivoli Business Systems Manager ETL process that enables Tivoli Business Systems Manager business data to be available in the Tivoli Enterprise Data Warehouse database.

Figure2: Tivoli Business Systems Manager and Tivoli Business Systems Manager ETL tasks

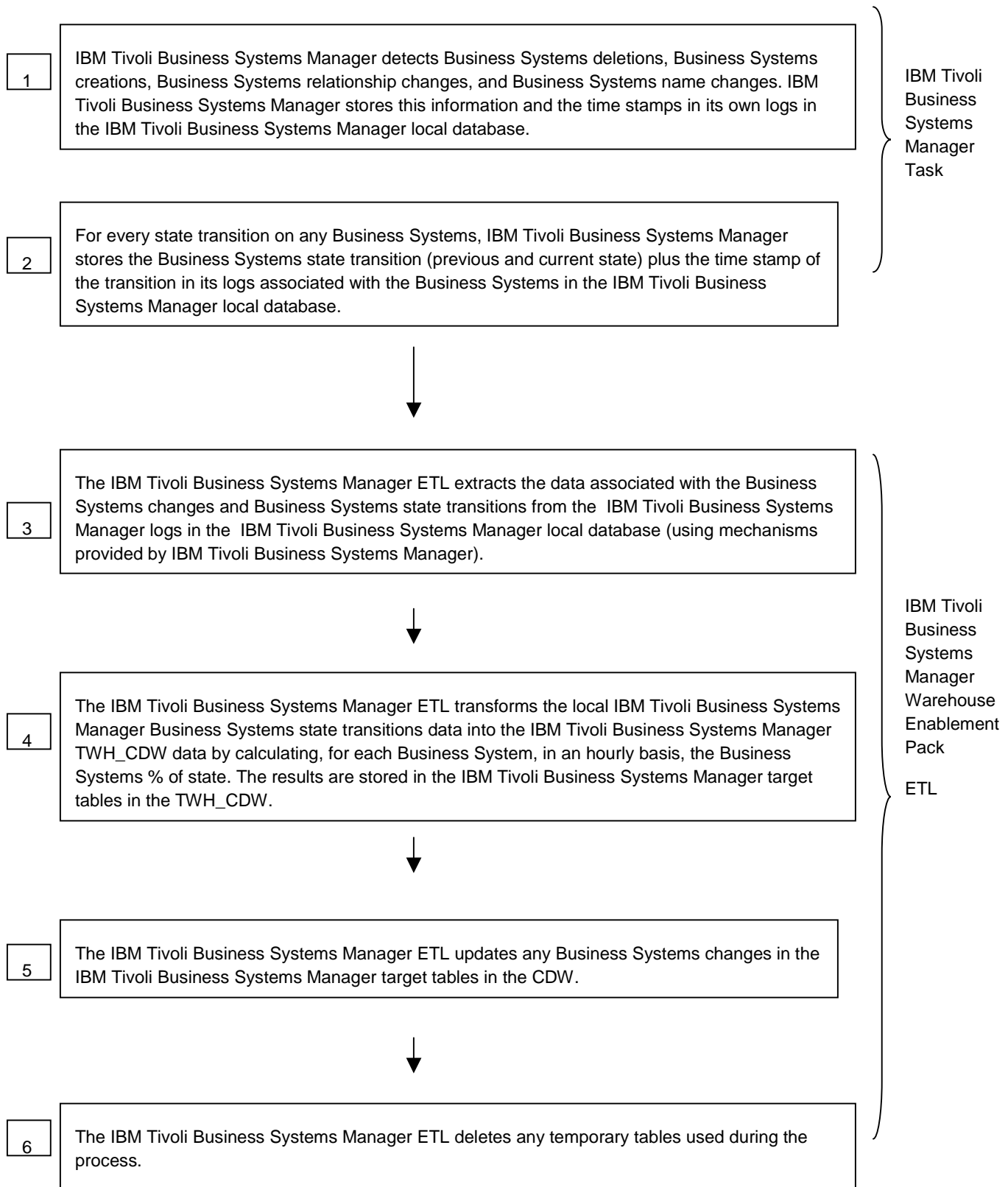


Figure 3: High-level view of the key components participating in the ETL process

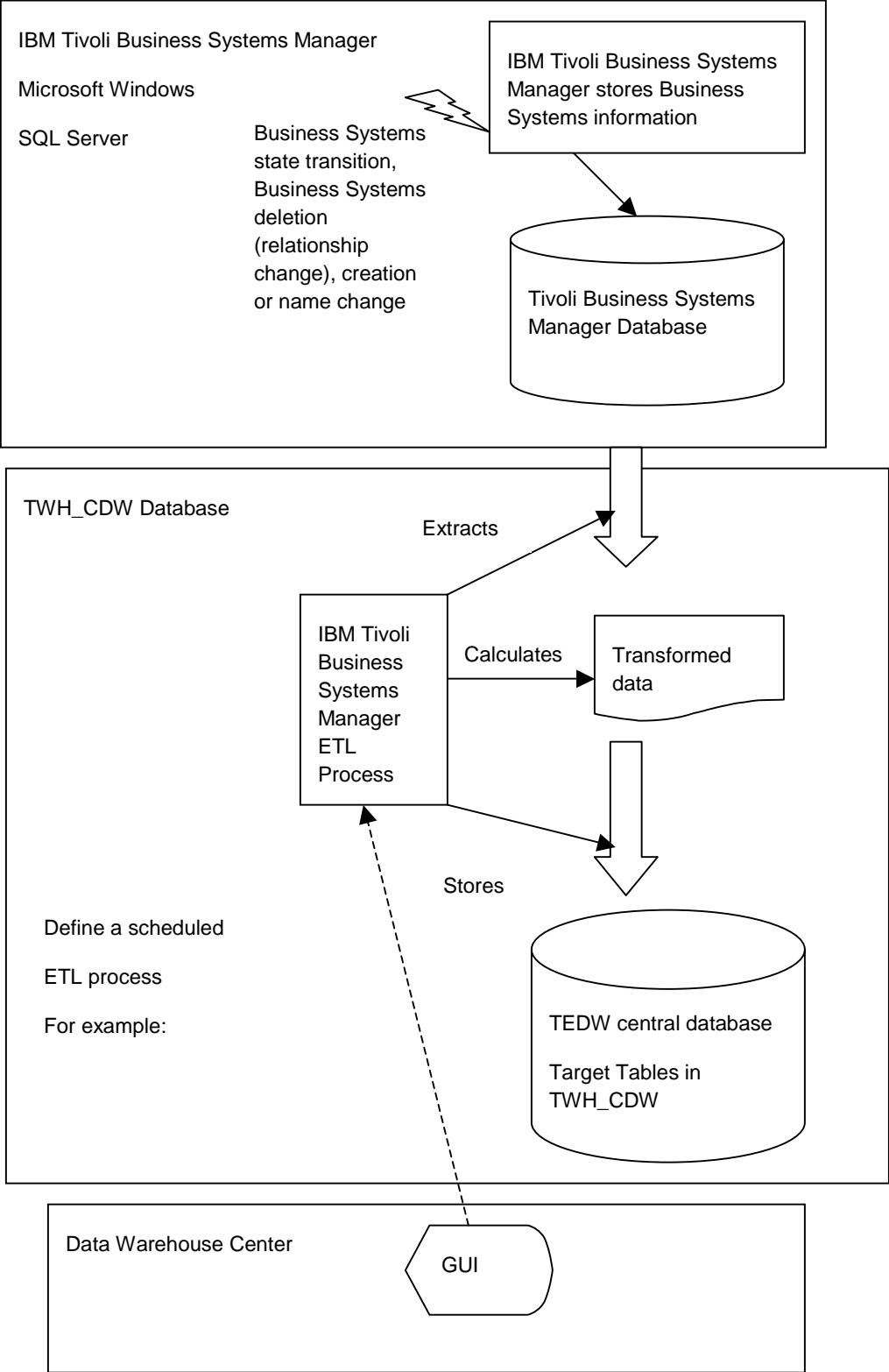


Figure 4: High-level view of the Tivoli Business Systems Manager source data required as input by the Tivoli Business Systems Manager ETL process

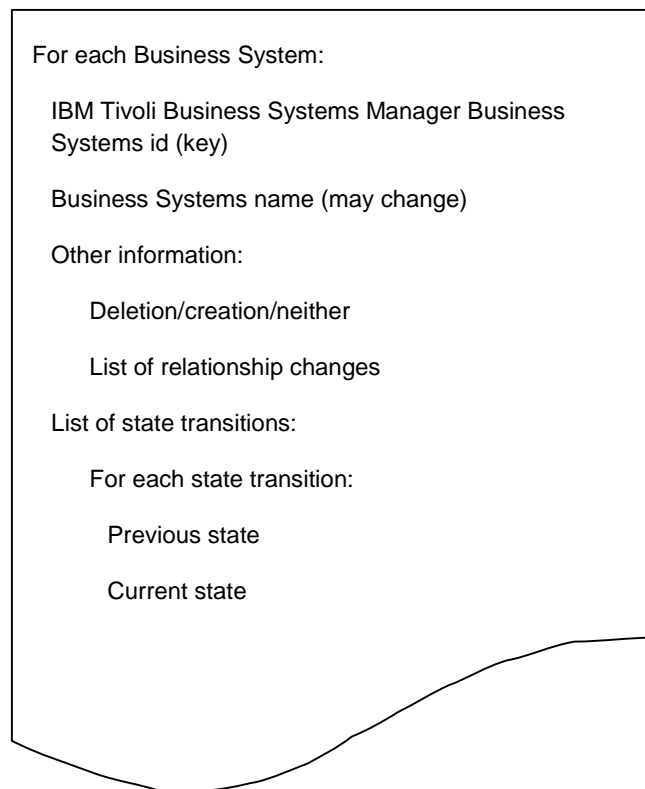
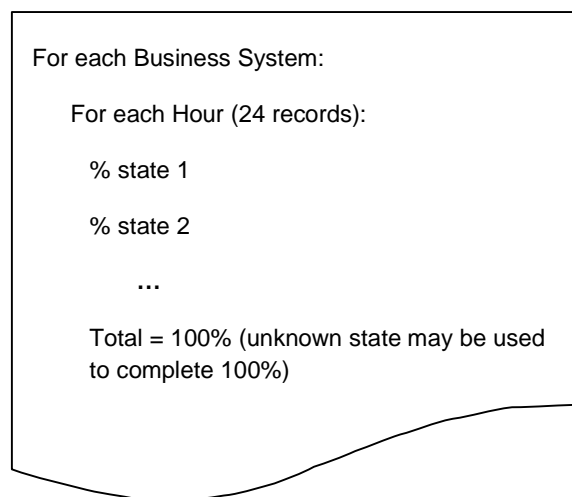


Figure 5: High-level view of the Tivoli Business Systems Manager target data resulted from the Tivoli Business Systems Manager ETL process



Existing Tivoli Business Systems Manager components already capture the local Tivoli Business Systems Manager data required as input for the Tivoli Business Systems Manager and Tivoli Enterprise Data Warehouse integration. The Tivoli Business Systems Manager ETL has store procedures to extract data from the Tivoli Business Systems Manager database, calculate the measurements, and store the resulted data into the Tivoli Business Systems Manager target tables in the Tivoli Enterprise Data Warehouse database (central data warehouse schema).

The total % state for a given Business Systems within an hour will always add up to 100%. If required, it uses “unknown” to complete the 100%.

3 Installing of the warehouse pack

3.1 Prerequisites

1. Tivoli Enterprise Data Warehouse V1.1 with fix pack 2.0 or greater
2. IBM Tivoli Service Level Advisor V1.2.0 or greater

If IBM Tivoli Service Level Advisor 1.2.1 with PF1 or greater is used, it requires IBM Tivoli Service Level Advisor APAR IY46001 interim fix.

3. Tivoli Business Systems Manager V2.1.1 Fix Pack 6 or greater

3.2 Supported hardware and software

Tivoli Business Systems Manager warehouse pack, Version 2.1.1.0, supports Tivoli Business Systems Manager Version 2.1.1 with fix pack 6 or greater. It supports all versions and platforms described in Tivoli Enterprise Data Warehouse 1.1 with fix pack 1 or greater.

3.3 Limitations

Tivoli Business Systems Manager ETL does not provide an ETL2 or reports for Tivoli Business Systems Manager data.

The data warehouse database cannot be initialized using the Tivoli Business Systems Manager ETL with the prune value longer than about 30 days. This limitation is subject to changes based on the size of the customer database and the number of Business Systems resources. To adjust the Prune value, see section 3.8 Post-Installation steps.

3.4 Database sizing considerations

There is no visible impact on source database size from Tivoli Business Systems Manager. The target Tivoli Enterprise Data Warehouse database server requires about 100MB each year for every 100 Business Systems resources in TWH_CDW database. This number changes based on the feature of the data. The more state changes of Business System resources made in Tivoli Business Systems Manager the more space is required.

3.5 Data sources and targets

Tivoli Business Systems Manager warehouse pack ETL uses the Object database on the Tivoli Business Systems Manager database server as the source database and the TWH_CDW database in central Tivoli Enterprise Data Warehouse as the target database. All tables in the targets, including the staging tables, are in the TWG schema.

3.6 Pre-installation steps

There are no pre-installation steps for the fresh installation of Tivoli Business Systems Manager warehouse pack. If you have the previous version of the Tivoli Business Systems Manager warehouse pack installed, the following steps are required for the pre-installation:

1. Back up all Tivoli Business Systems Manager databases
2. Back up Tivoli Enterprise Data Warehouse databases
3. Back up IBM Tivoli Service Level Advisor databases
4. Uninstall the Tivoli Business Systems Manager warehouse pack V1.5.0.0 or V2.1.0.0

The migration is also required as described in the Post-installation steps.

3.7 Installation procedure

To install the Tivoli Business Systems Manager warehouse pack V2.1.1.0, perform the following steps:

1. Make sure that Tivoli Business Systems Manager V2.1.1 with patch 1 is installed and the Merant ODBC data source is available on the Tivoli Enterprise Data Warehouse database server.

2. Make sure that all prerequisite product patches are applied.
3. Make sure that Tivoli Enterprise Data Warehouse is installed. For instructions about installing Tivoli Enterprise Data Warehouse, refer to "Installing and Configuring Tivoli Enterprise Data Warehouse".
4. Install the Tivoli Business Systems Manager warehouse pack V2.1.1.0. For instructions about installing and configuring Tivoli Enterprise Data Warehouse pack, refer to "Installing and Configuring Tivoli Enterprise Data Warehouse".
5. Perform the post-installation steps described in on page 14.

3.8 Post-installation steps

1. Update the user name and password for the data source and target in Tivoli Enterprise Data Warehouse. In the Warehouse window, change the user name and password for GTM-related warehouse sources and targets.
2. If you have the previous version of Tivoli Business Systems Manager Warehouse Enablement Pack installed, proceed to the migration section. It is required to migrate the existing data in Tivoli Enterprise Data Warehouse and IBM Tivoli Service Level Advisor, as described in the migration section 3.9.
3. Create the "GTM_DB" data source on the Tivoli Enterprise Data Warehouse database server. When creating the GTM_DB data source for the Tivoli Business Systems Manager ETL in "System DSN", use the "DataWHSE 3.60 32-bit SQL Server" driver.
4. Adjust the prune value to determine the amount of data retained.

The TWG.Prune_Msmt_Control warehouse table in the data warehouse determines the amount of measurement data retained by the Tivoli Enterprise Data Warehouse. When the Tivoli Business Systems Manager ETL is run for the first time, it loads previous historical alert state percentage data for the Business Systems. This value controls the amount of data initially loaded and retained.

By default, the Tivoli Business Systems Manager ETL is set up to retain data for one year. To view the current record from the Tivoli Enterprise Data Warehouse central database, TWH_CDW, using the following SQL command:

```
select * from twg.prune_msmt_control where msrc_cd='GTM' and tmsum_cd='H'
```

You will receive the similar to the following:

```
MSRC_CD  TMSUM_CD  PMSMTC_AGE_IN_DAYS
-----
GTM      H          10000.
```

The PMSmtC_Age_In_Days column determines the duration. This is actually a date duration stored in the form YYYYMMDD, thus the above example is one year. To adjust this, this column can be updated using a value in that form, left padded with zeros out to 8 columns, without quotes. For example, to change the existing entry to 2 years and 6 months, enter the following:

```
update twg.prune_msmt_control set pmsmtc_age_in_days=00020600 where msrc_cd='GTM' and tmsum_cd='H'
```

Be sure to make any needed adjustment prior to running the Tivoli Business Systems Manager ETL for the first time.

5. Schedule all the steps in GTM_c05_LOBState_process process to run once a day in the following order:
 - GTM_c05_s010_LoadLOBStage
 - GTM_c05_s020_LoadLOBCDW
 - GTM_c05_s030_Stage_LobPrcState

These steps have to be scheduled before IBM Tivoli Service Level Advisor ETL runs in order for IBM Tivoli Service Level Advisor ETL to pick up the new data loaded with Tivoli Business Systems Manager ETL.

3.9 *Migrate Tivoli Business Systems Manager ETL from V1.5.0 or V2.1.0 to V2.1.1*

The Tivoli Business Systems Manager Warehouse Enablement Pack 2.1.1 has the following design changes:

1. Embedded Business System resources created by drag and drop

In the previous version of the Tivoli Business Systems Manager Warehouse Enablement Pack, the embedded resources are not created in Tivoli Enterprise Data Warehouse. They are represented with the links of the original to the parents of the embedded resources. For example:

Business System (LOB A)

Business System (LOB B)

Business System (LOB A) (Created by drag and drop)

Three resources are created in the Tivoli Business Systems Manager named LOB A, LOB B, and LOB A. Two components are created in Tivoli Enterprise Data Warehouse named LOB A and LOB B. A parent - child relationship for LOB B and LOB A is created.

In this release, the Tivoli Business Systems Manager creates one component in Tivoli Enterprise Data Warehouse for each Business System resource in Tivoli Business Systems Manager. The Tivoli Enterprise Data Warehouse database has the same resource definitions as the Tivoli Business Systems Manager database. Three components are created in the Tivoli Enterprise Data Warehouse database in the example described above for the three resources in the Tivoli Business Systems Manager database.

2. Renaming the Business System Resources

In the previous version of the Tivoli Business Systems Manager WEP, when a Business System resource is renamed in the Tivoli Business Systems Manager, a new attribute with TBSM_NM type is created for the component using the new name as compattr_val.

In this release, when a Business System resources is renamed in the Tivoli Business Systems Manager, the Tivoli Business Systems Manager ETL performs the following changes:

- Updates the Comp_NM column of COMP table in TWH_CDW database for the component
- Inserts a new NAME attribute for the component using the new component name as COMPAttr_VAL
- Inserts a new TBSM_NM attribute for the component using the new component name as COMPAttr_VAL

Based on the above design changes, the following migration is required if you previously loaded Tivoli Business Systems Manager data into Tivoli Enterprise Data Warehouse:

1. Creates new components in TWH_CDW for the Tivoli Business Systems Manager embedded resources
2. Deletes the relationships which represent the previous embedded Tivoli Business Systems Manager resources
3. Updates COMP_NM in TWG.COMP for the previous renamed components
4. Inserts the NAME attributes in COMPATTR table for all the Business System resources created by Tivoli Business Systems Manager ETL

5. Provides the mapping the original and new component ids and component names for IBM Tivoli Service Level Advisor migration

The migration must be done in both the Tivoli Business Systems Manager ETL and IBM Tivoli Service Level Advisor database. The migration version control is 'tbsm_211', which can be found in the Tivoli Business Systems Manager database.

3.9.1 Migration steps

Before starting the migration of Tivoli Business Systems Manager data in Tivoli Enterprise Data Warehouse and IBM Tivoli Service Level Advisor, ensure that the level of the Tivoli Business Systems Manager is V2.1.1 with patch 1. The migration steps are:

1. Promote GTM_c06_s010_Migration step to test mode and run it
2. Promote GTM_c05_s010_LoadLOBStage and GTM_c05_s020_LoadLOBCDW to test mode and run them in the order
3. Promote GTM_c06_s020_Migration step to test mode and run it
4. Run IBM Tivoli Service Level Advisor migration steps as described in APAR IY46001 interim fix
5. Continue with the Post-installation step 5

4 Maintaining

4.1 *Backing up and restoring*

There is no special requirement for the Tivoli Business Systems Manager data in Tivoli Enterprise Data Warehouse central database.

4.2 *Pruning*

The Tivoli Business Systems Manager WEP V2.1.1 provides no specific pruning process.

5 ETP Processes

The Tivoli Business Systems Manager Warehouse Enablement Pack has one GTM_Tivoli_Business_Systems_Manager_V2.1.1_Subject_Area subject area. It contains two processes:

GTM_c05_LOBState_process

GTM_c06_Migration_process

Detailed information for each process are provided below.

GTM_c05_LOBState_process

This process extracts Business Systems resource creation, deletion, renaming, and alert state change information and loads it into the TWH_CDW database in the central IBM Tivoli Enterprise Data Warehouse.

This process has the following steps:

- GTM_c05_s010_LoadLOBStage
This step extracts Business Systems resource creation, deletion, and renaming data from the source database and loads it into the stage table in the TWH_CDW target database.
- GTM_c05_s020_LoadLOBCDW
This step processes the stage data and puts it into the operational tables. This step is required to run after the GTM_c05_s010_LoadLOBStage step.
- GTM_c05_s030_Stage_LobPrcState
This step loads the alert state change data into the stage table from the source database into the THW_CDW target database. This step is required to run after the GTM_c05_s020_LoadLOBCDW step.
- GTM_c05_s040_Msmt
This step processes the stage data loaded by the GTM_c05_s030_Stage_LobPrcState step and puts the data into the TWG.MSMT operational tables. This step is required to run after the GTM_c05_s030_Stage_LobPrcState step.

GTM_c06_Migration_process

This process is designed for migrations and future improvement. The migration steps require process control in the scripts. The process control table, MIGR_CTRL, is located in the Tivoli Business Systems Manager Object database. When the steps are run for the first time, the indicator for the actions is recorded. After the first run, these steps do nothing unless new code with a different indicator is added.

Run this process as described in the migration instruction (Section 3.8) or the installation instruction in the Readme for the fix packs. This process should run on-demand.

This process has the following steps:

- GTM_c06_s010_Migration
This is the first step of the migration. It can perform different actions in the different blocks of code. However, the detailed description for each block of code is documented with the version marker in the MIGR_CTRL table.
- GTM_c06_s020_Migration
This is the second step of the migration. It can perform different actions in the different blocks of code. However, the detailed description for each block of code is documented with the version marker in the MIGR_CTRL table.

- GTM_c06_s030_ Migration

This is the third step of the migration. It can perform different actions in the different blocks of code. However, the detailed description for each block of code is documented with the version marker in the MIGR_CRTL table.

- GTM_c06_s040_ Migration

This is the forth step of the migration. It can perform different actions in the different blocks of code. However, the detailed description for each block of code is documented with the version marker in the MIGR_CRTL table.

6 Generic schema implementation

Before reading this section, read about the generic schema for the Tivoli Enterprise Data Warehouse central data warehouse, which is described in *Enabling an Application for Tivoli Enterprise Data Warehouse*. That document defines the content of each table and explains the relationships between the tables in this document.

Design:

- ⇒ Multi-parent relationships – A given Business Systems can have n parents ($n \geq 0$). The same way, a given Business Systems can have m child ($m \geq 0$). Therefore, the CompReln table is used to hold this parent-child relationship and not the Comp_Parent_ID field in the Comp table (this is set to NULL).
- ⇒ Create one component in the Tivoli Enterprise Data Warehouse central database for each Business System resource in Tivoli Business System manager because different Business System resources can have different states even though they are linked to the same resource.
- ⇒ Tivoli Business Systems Manager Business Systems ID – The Tivoli Business Systems Manager Business Systems internal identification is stored in the Comp_Corr_Val field in the Comp table. This information identifies the Business Systems within Tivoli Business Systems Manager.
- ⇒ Soft Links x Hard Links – No difference is made between the Business Systems links in the relationship tables. All Business Systems relationships (links) are represented in the same way. There is also no order distinction between relationships at the same level (peers). All these have been considered of no relevance in the context of the business information provided in the Tivoli Enterprise Data Warehouse.
- ⇒ Deletion of Business Systems – No Business Systems are removed from the central data warehouse tables. When a Business Systems is deleted in Tivoli Business Systems Manager, the ETL process updates the Comp_End_DtTm field from 9999 to the real end date/time, indicating that this Business System has been removed. The data is kept for historical purposes.
- ⇒ The ETL process adds two new attribute entries with the start date and time using NAME and TBSMNM attribute types. The previous attribute name end date and time is set to the real end date and time. The Comp_Nm column in the Comp table is also updated with the new name.
- ⇒ The relationship changes are handled in a similar way. New relationships are added while deleted relationships have their end date and time set from 9999 to the real end date/time.
- ⇒ Note: Regarding the last three points above, a trigger is provided by Tivoli Enterprise Data Warehouse to handle inserts into CompAttr that is designed to fill in the end date when an attribute changes value, so that ETLs do not have to provide this themselves.

Sample Scenario:

The following example was used to fill in some of the non-static fields in the tables below:

Business Systems: Sales (1) /Description: Direct Sales Org. for USA

Business Systems: Eastern Sales (6)

Business Systems: CICS Eastern (2) /Description:

Business Systems: Western Sales (5)

Business Systems: CICS Western (7) /Description:

Business Systems: CICS Eastern (2) /Description:

For example, the Measurement data has been collected for 3 hours and the following data is shown:

1.First hour: (15:00)

Business Systems (6) is green 100%

Business Systems (1) is green 50% and yellow 50%

Business Systems (5) is red 100%

Business Systems (2) is red 100%

Business Systems (7) is red 100%

2.Second hour: (16:00)

Business Systems (6) is green 50% and unknown 50%

Business Systems (1) is green 100%

Business Systems (5) is yellow 25% and red 75%

Business Systems (2) is yellow 25% and red 75%

Business Systems (7) is yellow 25% and red 75%

3.Third hour: (17:00)

All Business Systems are green 100%

6.1 Component configuration

Shaded columns in the following tables can be translated by the application. *Installing and Configuring Tivoli Enterprise Data Warehouse* contains instructions for installing support for additional languages.

6.1.1 Component type (table CompTyp)

CompTyp_Cd CHAR(17)	CompTyp_Parent_Cd CHAR(17)	CompTyp_Nm VARCHAR(120)	CompTyp_Strt_DtTm TIMESTAMP	CompTyp_End_DtTm TIMESTAMP
TBSM_LOB	NULL	TBSM Line of Business	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000

6.1.2 Component (table Comp)

Comp_ID	Comp_Typ _Cd	Centr_Cd	Cust_ID	Com_Cor r_Id	Comp_Nm VARCHAR	Comp_Corr_Val	Comp_Strt_ DtTm	Comp_End_ DtTm	Comp_Ds VARCHAR
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INTEGER	CHAR(17)	CHAR(6)	INTEGER	INTEGER	(254)	VARCHAR(254)	TIMESTAMP	TIMESTAMP	(254)
1	TBSM_LO B	CDW	1		Sales	TBSM_LOB_ID	2001-11-28- 11.36.54.00 0000	9999-01-01- 00.00.00.00 0000	Direct Sales Org. for USA
2	TBSM_LO B	CDW	1		CICS Eastern	TBSM_LOB_ID	2001-11-28- 11.36.54.0 00000	9999-01-01- 00.00.00.0 00000	TBSM LOB description
5	TBSM_LO B	CDW	1		Western Sales	TBSM_LOB_ID	2001-11-28- 11.36.54.0 00000	9999-01-01- 00.00.00.0 00000	Direct Sales for Western USA
6	TBSM_LO B	CDW	1		Eastern Sales	TBSM_LOB_ID	2001-11-28- 11.36.54.0 00000	9999-01-01- 00.00.00.0 00000	Direct Sales for Western USA
7	TBSM_LO B	CDW	1		CICS Western	TBSM_LOB_ID	2001-11-28- 11.36.54.0 00000	9999-01-01- 00.00.00.0 00000	TBSM LOB description

6.1.3 Component relationship type (table RelnTyp)

RelnTyp_Cd CHAR(6)	RelnTyp_Nm VARCHAR(120)
PCHILD	Parent Child Relationship

6.1.4 Component relationship rule (table RelnRul)

CompTyp_Source_Cd CHAR(17)	CompTyp_Target_Cd CHAR(17)	RelnTyp_Cd CHAR(6)	RelnRul_Strt_DtTm TIMESTAMP	RelnRul_End_DtTm TIMESTAMP
TBSM_LOB	TBSM_LOB	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000

6.1.5 Component relationship (table CompReIn)

CompReIn_ID INTEGER	Comp_Source_ID INTEGER	Comp_Target_ID INTEGER	RelnTyp_Cd CHAR(6)	CompReIn_Strt_DtTm TIMESTAMP	CompReIn_End_DtTm TIMESTAMP
1	6	2	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000
2	5	2	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000

CompReIn_ID INTEGER	Comp_Source_ID INTEGER	Comp_Target_ID INTEGER	ReInTyp_Cd CHAR(6)	CompReIn_Strt_DtTm TIMESTAMP	CompReIn_End_DtTm TIMESTAMP
3	1	6	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000
4	1	5	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000
5	5	7	PCHILD	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000

6.1.6 Attribute type (table AttrTyp)

AttrTyp_Cd CHAR(17)	AttrTyp_Nm VARCHAR(120)
TBSMNM*	TBSM Component Name
NAME	Name

* TBSM Component Name attribute will be removed in the future release. Only the Name attribute is used for the component name.

6.1.7 Attribute rule (table AttrRul)

CompTyp_Cd CHAR(17)	AttrTyp_Cd CHAR(17)	AttrRul_Strt_DtTm TIMESTAMP	AttrRul_End_DtTm TIMESTAMP	AttrRul_Dom_Ind CHAR
TBSM_LOB	TBSMNM	2001-11-28-11.36.54.000000	9999-01-01- 00.00.00.000000	N
TBSM_LOB	NAME	2001-11-28-11.36.54.000000	9999-01-01- 00.00.00.000000	N

6.1.8 Attribute domain (table AttrDom)

AttrDom_I D INTEGER	CompTyp_Cd CHAR(17)	AttrTyp_Cd CHAR(17)	AttrDom_ Strt_DtT m TIMESTA MP	AttrDom_ End_DtT m TIMESTA MP	AttrDom_Val VARCHAR(254)	AttrDom_Ds VARCHAR(254)

6.1.9 Component attribute (table CompAttr)

CompAttr_ID INTEGER	Comp_ID INTEGER	AttrTyp_Cd CHAR(17)	CompAttr_Strt_DtT m TIMESTAMP	CompAttr_End_DtT m TIMESTAMP	CompAttr_Val VARCHAR(254)
1	6	TBSMNM	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Eastern Sales
2	2	TBSMNM	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	CICS Eastern
3	1	TBSMNM	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Sales
4	7	TBSMNM	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	CICS Western
5	5	TBSMNM	2001-11-28- 11.36.54.000000	2001-12-28- 11.36.54.000000	Old Western Sales
6	5	TBSMNM	2001-12-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Western Sales
7	5	NAME	2001-12-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Western Sales
8	6	NAME	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Eastern Sales
9	2	NAME	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	CICS Eastern
10	1	NAME	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	Sales
11	7	NAME	2001-11-28- 11.36.54.000000	9999-01-01- 00.00.00.000000	CICS Western

6.2 Component measurement

6.2.1 Measurement group type (table MGrpTyp)

MgrpTyp_Cd CHAR(6)	MGrpTyp_Nm VARCHAR(120)
CATEG	Category
GROUP	Aggregate Types or Group Functions
STATE	State

6.2.2 Measurement group (table MGrp)

MGrp_Cd CHAR(6)	MGrpTyp_Cd CHAR(6)	MGrp_Parent_Cd CHAR(6)	MGrp_Nm VARCHAR(120)
LOBSTA	STATE	NULL	Line of Business Status
AVG_E	GROUP	NULL	Average Value Exists

6.2.3 Measurement group member (table MGrpMbr)

MGrp_Cd CHAR(6)	MGrpTyp_Cd CHAR(6)	MsmtTyp_ID INTEGER
LOBSTA	STATE	1
LOBSTA	STATE	2
LOBSTA	STATE	3
LOBSTA	STATE	4
AVG_E	GROUP	1
AVG_E	GROUP	2
AVG_E	GROUP	3
AVG_E	GROUP	4

6.2.4 Measurement unit category (table MUnitCat)

MunitCat_Cd CHAR(6)	MunitCat_Nm VARCHAR(120)
PRC	Percentage

6.2.5 Measurement unit (table MUnit)

MUnit_Cd CHAR(6)	MUnitCat_Cd CHAR(6)	Munit_Nm VARCHAR(120)
PRC	PRC	Percentage

6.2.6 Time summary (table TmSum)

The period over which a measurement may be summarized.

TmSum_Cd CHAR	TmSum_Nm VARCHAR(120)
H	Hourly

6.2.7 Measurement source (table MSrc)

MSrc_Cd CHAR(6)	MSrc_Parent_Cd CHAR(6)	MSrc_Nm VARCHAR(120)
Tivoli	NULL	Tivoli Application

MSrc_Cd CHAR(6)	MSrc_Parent_Cd CHAR(6)	MSrc_Nm VARCHAR(120)
GTM	Tivoli	Tivoli Business System Manager

6.2.8 Measurement type (table MsmtTyp)

MsmtTyp_ID INTEGER	MUnit_Cd CHAR(6)	MSrc_Cd CHAR (6)	MsmtTyp_Nm VARCHAR(120)	MsmtTyp_Ds VARCHAR(254)
1	PRC	GTM	LOB_state_unknown	LOB state unknown
2	PRC	GTM	LOB_state_green	LOB state green
3	PRC	GTM	LOB_state_yellow	LOB state yellow
4	PRC	GTM	LOB_state_red	LOB state red

6.2.9 Component measurement rule (table MsmtRul)

CompTyp_Cd CHAR(17)	MsmtTyp_ID INTEGER
TBSM_LOB	1
TBSM_LOB	2
TBSM_LOB	3
TBSM_LOB	4

6.2.10 Measurement (table Msmt)

Msmt_ID BIGINT	Comp_ID INTEGER	MsmtType_ID INTEGER	Tm_Sum_Cd CHAR	Msmt_Strt_Dt DATE	Msmt_Strt_Tm TIME	Msmt_Min_Val FLOAT	Msmt_Max_Val FLOAT	Msmt_Avg_Val FLOAT	Msmt_Tot_Val FLOAT	Msmt_Smpl_Cnt INTEGER	Msmt_Err_Cnt INTEGER
1	9	2	H	10/31/01	15:00:00			100			
2	9	2	H	10/31/01	16:00:00			50			
3	9	1	H	10/31	16:00			50			

				/01	:00						
4	9	2	H	10/31	17:00			100			
				/01	:00						
5	1	2	H	10/31	15:00			50			
				/01	:00						
6	1	3	H	10/31	15:00			50			
				/01	:00						
7	1	2	H	10/31	16:00			100			
				/01	:00r						
8	1	2	H	10/31	17:00			100			
				/01	:00						
9	5	4	H	10/31	15:00			100			
				/01	:00						
10	5	3	H	10/31	16:00			25			
				/01	:00						
11	5	4	H	10/31	16:00			75			
				/01	:00						
12	5	2	H	10/31	17:00			100			
				/01	:00						

6.3 Helper tables

No Helper tables are provided.

6.4 Exception tables

No Exception tables are provided.

6.5 Incremental extraction

The incremental extracts are handled using one or more timestamps and a table in Tivoli Business Systems Manager with the Business Systems already loaded into the central data warehouse. This helps to determine any name changes to Business Systems since the last load. Given the typical number of Business Systems in an installation, such a table stored within Tivoli Business Systems Manager should not be an issue. A timestamp enables the load of the measurements since the last time the ETL was run. Since the measurement data is per hour, this is most likely to use the last whole hour as its cutoff for each update.

Since the existing data in Tivoli Business Systems Manager contains timestamps as to when the alert state of a Business System changes, the calculation of hourly state percentages always need the information on the state of each Business Systems from the last load. These data are stored in Tivoli Business Systems Manager database.

Since Tivoli Business Systems Manager measurement data must represent percentages for an entire hour, calculations are made for state changes up to the last whole hour for each extraction. So, the calculation might, for example, be based on all records <= '12/5/2001 01:00', using a simple timestamp stored in Tivoli Business Systems Manager to define this.

In order to handle incremental loads of Business Systems changes, additions, and deletions, a table in Tivoli Business Systems Manager tracks the current Business Systems data that exists in the warehouse. This enables a load of delta changes simply based on what changed. First, the status of a Business Systems is set to 'in-process' in the Tivoli Business Systems Manager table. After the Business Systems data is put into the actual central data warehouse tables, the status of the Business Systems in the Tivoli Business Systems Manager table is set to 'complete' status. This enables for recovery, as Tivoli Business Systems Manager procedures would be able to resend any data if it detects the data has not made it all the way to the central data warehouse.

