WealthSuite
Core Banking MESI Architecture
Standard Chartered Bank

TEMENOS

The software specialist for banking and finance

Table of Contents

Document History

Author	Version	Date
Vijaya Ramanathan	Draft	25-Oct-2016
Vijaya Ramanathan	1.0	14-Nov-2016
Vijaya Ramanathan	1.1	23-Nov-2016
Vijaya Ramanathan	1.2	30-Nov-2016

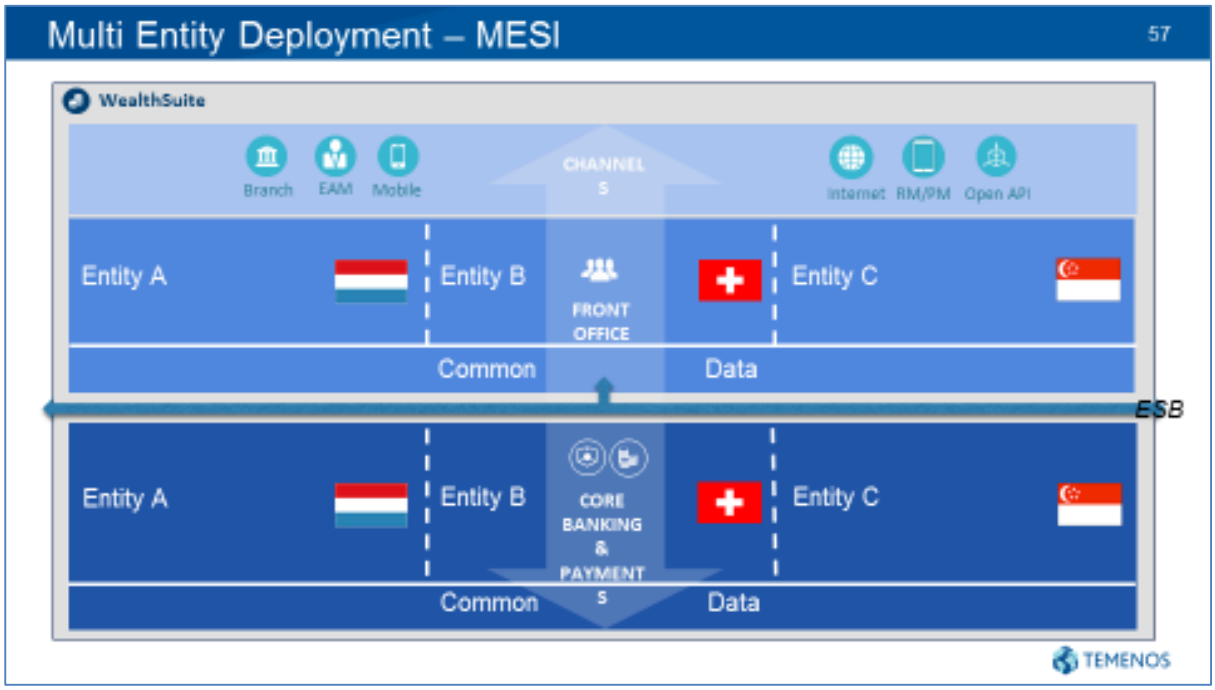
Comments:

Introduction

Standard Chartered Bank (SCB) will be implementing Temenos WealthSuite as part of their Enable Program. This document is created to provide information about deployment of Multi-Entity on Single Instance (MESI) architecture of T24 as the back office solution covering 34 countries. Though this document is created for general audience some basic technical understanding of T24 application is expected of the reader to get a better interpretation of MESI architecture explained in this document.

MESI Architecture

A Multiple Entities in Single Instance or MESI Architecture constitutes a single T24 instance to host and manages operations of more than 1 Business entity independently using T24 Multi-Company and Global Processing modules. Business entities will be spread across multiple time zones.



This architecture consists of

- A single set of Application binaries and libraries
- Single database with ability to store data in separate schema/tablespaces[#]
- Financial data stored in a dedicated set of tables per entity
- Independent business operation for each entity
- Independent Close of Business (COB) for each entity
- Application hosted on multiple small application server instances for High Availability and load balancing related to server resources
- Single system maintenance window

[#] Separate schema is subject to Product Enhancement for COMPANY.SCHEMA feature

There will be 2 databases if Data Lifecycle Management is implemented.

This document only covers the technical scope of the MESI Architecture for T24. Business requirements are not covered as part of this document.

TAP architecture is only a representation and does not reflect the actual solution.

Multi-Company

T24 supports operation of multiple companies within single T24 instance. These can operate independently or they can share CUSTOMER files and/or certain files that contain controlling (“static”)

financial information. Companies can also share operation of NOSTRO accounts. SMS maintains security of access at company level.

Transactions can take place involving accounts in different companies and appropriate entries are made to inter-company accounts automatically.

CRF reports can be produced for combinations of companies with currencies converted as required.

A single company could be described as the related data items that allow the production of a set of balanced books for a single financial entity.

In T24 Companies can be classified as four types.

Master Company

This is the first company set up in a T24 installation (normally BNK) and it owns a complete set of data tables. The Master Company can also be a Lead company. The master company is present in all types of T24 environment.

Lead Company

Lead Company can share files with other companies and stores all financial level data in its own set of tables. A lead company is defined on installation by indicating that the financial tables are to be owned by the company being created. A Multi Company is same as the Lead Company but without any linked Branch Company.

Branch Company

A branch is defined as a standard T24 Company, all data except for those tables related to company level reports and COB list processing tables are shared with the designated lead company. A Branch Company is defined on installation by indicating that the financial tables are to be owned by an existing lead company. A branch can only be linked to a Lead Company. It is not possible to link a branch to another branch. A branch always shares its local currency and batch holiday table with its lead company.

Accounting Company

An Accounting Company is used when there is a requirement to produce multiple sets of balanced financial reports for a single business entity. All accounts and contracts are input into and owned by the parent company. System records the accounting company for each asset and liability, and profit and loss items. It will not be possible to directly sign into an accounting company.

File sharing

T24 multi-company product allows banks to determine on what information can be share between companies during company creation. MESI Architecture for SCB is assumed to have the following type of multi-company setup.

- Applications of all types except INT File Classification will not be shared
- COB operations will be independent to each entity
- Each entity will have its own set of HOLIDAY definition
- SECURITY.MASTER data will be shared between all entities
- DE.ADDRESS data will be maintained in same tables for all companies
- <Any other items?>

Any change in above approach will require details discussion from the technical deployment scope to assess the impact and arrive at optimal setup where both company setup and infrastructure level resource management requirements are met.

Global Processing

The Global Processing (GP) product allows independent operation of companies within a T24 environment. The GP product allows independent close of business processing for companies while other companies continue to process online transactions. GP is will enable SCB to manage all its entities in multiple time zones to operate independently using single T24 instance.

COB operations can be performed for Group of Companies or Individual Company. Following provides setup required at high level for GP operations. Detailed explanation can be found in the User Guide.

Enabling GP

- GLOBAL.PROCESS field in SPF should be set to 'Y', to operate in a GP mode and allow the use of independent COB

COB for Group of Companies

- Records should be created in COMPANY.GROUP to logically group companies for COB processing
- COMPANY.GROUP field in COMPANY for the respective companies should be updated with the same COMPANY.GROUP ID
- COB can be run for a given group of companies by setting up TSA.SERVICE record COB-nnn where nnn is the COMPANY.GROUP ID

COB for Individual Company

- SEPARATE.EOD field in the respective COMPANY record should be set to Y
- COB can be run for the individual company by setting up TSA.SERVICE record COB-ccccccccc where ccccccccc is the COMPANY record ID

HOLIDAY setup consideration

In GP different calendars for each company can be maintained. The BATCH.HOLIDAY field in the company record controls the working day calendar. This must contain the country and region code that comprises the first four characters of the HOLIDAY table. Each working day in this calendar is an operational day for T24 with a corresponding Close of Business.

If GLOBAL.PROCESS is specified, the value of BATCH.HOLIDAY can be different between companies. In a non-GP environment the values must be the same between all companies.

Note: In a Group Accounting structure the BATCH.HOLIDAY must be the same for all companies in the same group.

In addition to the separate Batch Holiday definitions, the system also provides additional flexibility in the way the system treats each working day.

In the HOLIDAY record defined in OFFICIAL.HOLIDAY field in COMPANY application, the standard working day definitions for the country or region that the company operates in can be defined. The default value is BATCH.HOLIDAY.

In the HOLIDAY record defined in BRANCH.HOLIDAY field in COMPANY, the definition of a calendar that is used by the particular company can be defined. The actual working days of the branch may be different from the official holidays, for example; in the case of branch which opens in a shopping centre on a Saturday. The default value here is the OFFICIAL.HOLIDAY.

For transaction processing, the BRANCH.HOLIDAY value is used for the local country calendar in the default date calculations.

Multiple Time Zones

T24 as single instance supports multiple company/multi branch module installations and operation across multiple countries using their respective time zones. This will suit SCB which conduct transactions across different countries and time zones.

Multi-Time zone benefits the users by initiating business transactions based on their respective time zone in various geographical locations without affecting other entities in other parts of world. Multi-Time zone facilitates in storing all time-based, user processing details and audit trails using specific timestamp of the country. This functionality is used for audit purpose and also ensures the actual time, which is based on the local time zone is represented for ease of use to the banking users.

Features

- On Transaction processing audit fields are updated in local zone date and time

- SMS credentials can be setup and validated based on time zone as per the COMPANY definition
- PROTOCOL and OFS Request Detail logs are updated with local zone date and time

Apart from T24 level, all log files created by T24 at the OS level will carry the Timestamp based on the OS Time setting.

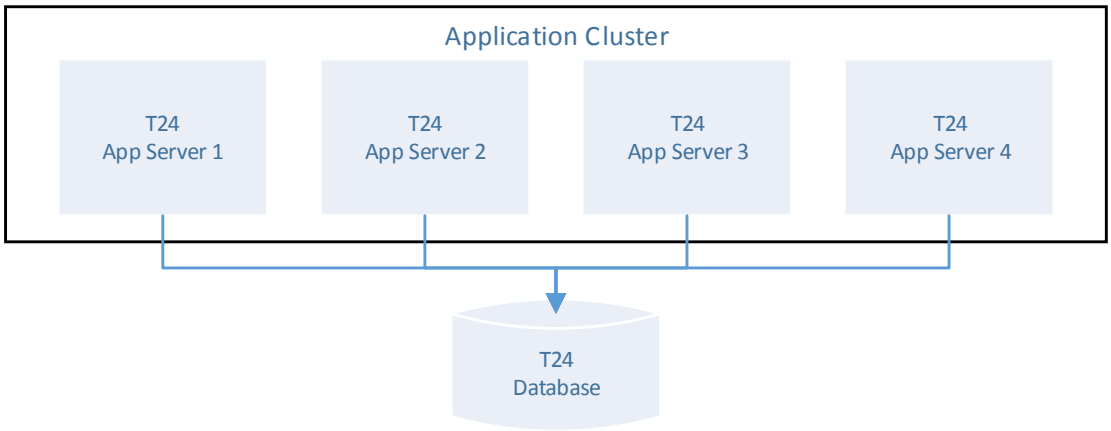
Application Deployment

Application deployment carries huge significance for SCB with operations of 34 countries spread across multiple time zones will share the available server resources at any given time.

There are multiple deployment models possible. Suitable modes should be chosen and reviewed in detail to understand the Pros and Cons. This will help to choose a best fit deployment model that caters to SCB's operational requirements. Following 3 models can be considered

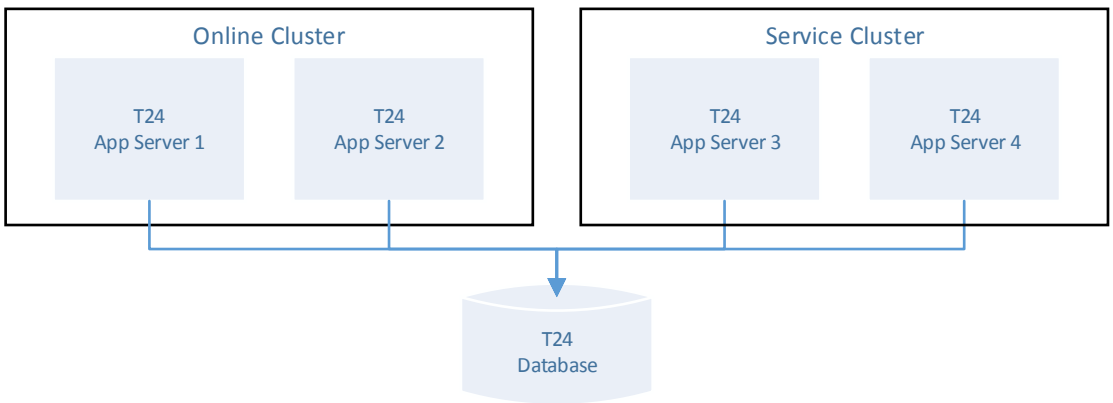
Model 1: Single application cluster to support all types of operation for the entire bank

- All nodes supports all type of activities
- COB and Online services for all countries can be distributed as required to balance the load in all nodes
- Load can vary on different time of the day and may require interventions to rebalance the load



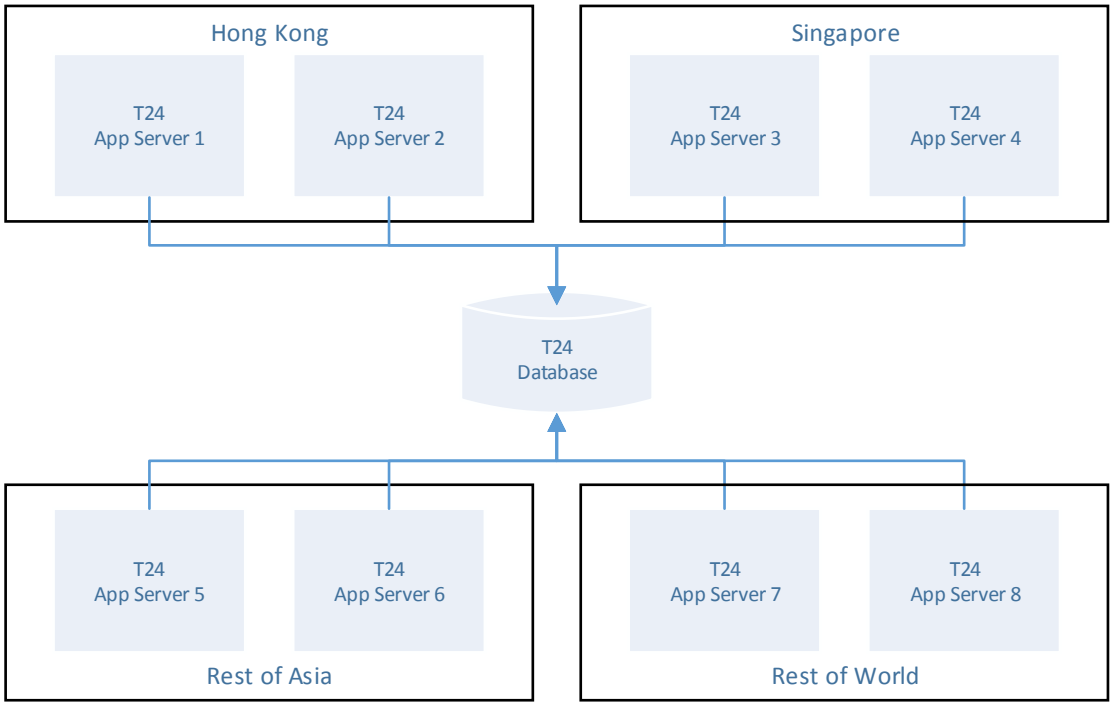
Model 2: 2 Clusters option for Online and Service based activities

- Segregation based on type of activity
- 1 Clusters to support Online activities – User as well as Real-time interfaces
- 1 Cluster to support Online Services and COB operations
- Online Cluster may have very low utilisation during non-Business hours taking all applicable countries into consideration



Model 3: Multiple Clusters based on Country/Region

- Segregation based on country/Region
- All operations for a country/region supported by a dedicated Cluster
- One country/region's operation does not impact the rest



The new solution being looked into for the Booking and Processing Centre should be taken into consideration while deciding the application deployment model.

OS Level file sharing

T24 creates and uses several directories at the Application Server. When T24 is deployed over multiple Application Servers nodes, most of these directories should be shared using a File Sharing solution between all nodes to allow access to data available in these directories from T24. In general the directory 'bnk.run' and all its content can be shared. However 'bnk.run' contains logs that are not accessed from application and hence only directories that are accessed from T24 should be shared. The main directories that should be shared are

&HOLD&

Delivery Inward and Outward folders

All directories created by application process

There is no requirement to share &COMO& since this contains application specific logs.

Service Architecture

T24 Service architecture (EB_Service) is used to run both Online Services as well as COB. When implementing T24 using multiple Application servers, it becomes necessary to define how Online Service and COB processes are run in such a way server resources are utilised optimally.

How an Online Service or COB is run can be managed in terms of

- On which Application Server it should run
- How many agents should be allocated
- Increasing or decreasing no. of agents allocated
- Scheduling

The application deployment model plays a key deciding factor on how services and COBs can be managed long with above aspects.

Online Services and COB are mostly company specific with few exceptions. There are some INT services and COB jobs that requires due consideration on how and when they should be run.

OFS.MESSAGE.SERVICE

- Any OFS message posted using the API OFS.POST.MESSAGE is processed by this service
- Should be running at all times in MESI Architecture
- Service cannot be made offline for 1 entity and other for remaining entities

Note: Running this as a company-wise service has been identified as a GAP

Delivery related services

- SWIFT.IN, SWIFT.OUT and PRINT.OUT are commonly used Delivery services
- Should be running at all times in MESI Architecture
- For SWIFT inward message, respective transactions will be created while COB is running for the respective entity as per Non-Stop processing
- For SWIFT outward message getting created during COB will be formatted and delivery to external system as per the interface setup

SECURITY.MASTER related COB jobs

There are few COB jobs related to SECURITY.MASTER that should be reviewed and decided whether any job needs to be run in all or 1 company in MESI architecture. Following table provides information about such jobs and recommendations on how to run the job.

STAGE NAME	BATCH>JOB	Description
SYSTEM WIDE	BNK/SC.SYS.END.OF.DAY> SC.CALC.YIELD.CON	The reason for the job SC.CALC.YIELD.CON to be running in all companies is because during Global processing there could be price feed from respective interface which needs to be considered and processed for the respective geographical location. Hence the job SC.CALC.YIELD.CON needs to be run in all companies.
SYSTEM WIDE	BNK/SC.SYS.END.OF.DAY> SC.SOD.RECALC.PRICES	The reason for the job SC.SOD.RECALC.PRICES to be running in all companies is because during Global processing there could be price feed from respective interface which needs to be considered and updated in MARKET.PRICE.
REPORTING	BNK/EOD.BACKVALUE> EOD.SECURITY.MASTER.HIST	The job EOD.SECURITY.MASTER.HIST updates the SECURITY.MASTER.HIST file. It compares the two files SECURITY.MASTER and SECURITY.MASTER.HIST in order to check whether any changes have been made to the existing SECURITY.MASTER record. If any changes have been made then the SECURITY.MASTER.HIST record is updated according to the changes made in SECURITY.MASTER. In a multi company environment this job can be made to run in one company alone provided no price update happens before the COB of the respective company where this job has been made Ad-hoc. In case if no price feed happens before the COB, then this job EOD.SECURITY.MASTER.HIST can run in one company and be made ad-hoc in other companies.

START OF DAY	BNK/SC.BATCH.START> SC.SM.INT.RATE.UPD	The reason for the job SC.SM.INT.RATE.UPD to be running in all companies is because during Global processing there could be price feed from respective interface which needs to be considered and processed for the respective geographical location. Hence the job SC.SM.INT.RATE.UPD needs to be run in all companies.
START OF DAY	BNK/SC.BATCH.START> SC.ACCR.DATE.UPDATE	During COB, in a multi company set it is not possible to determine which company batch will be run first. Hence the company which runs first is expected to perform the task of the job. If COB is run individually for the respective company then the job can me made ad-hoc in all the companies expect the one which is execute first.

INT Files

Delivery Print Advice Format

It is assumed SCB will use common formatting for Delivery Print advices and SWIFT message. If there is a need to use different format for a particular entity then this possible only for Print advices through DE.PRODUCT.

Access to data in INT Files

There are certain INT files that holds data from all entities or shared between entities. SMS setup is required to control access if necessary. Key tables are

DE.ADDRESS

DE.O.HEADER

DE.I.HEADER

HOLD.CONTROL

SECURITY.MASTER

There are similar system level or Technical tables as above.

BATCH

TSA.SERVICE

Audit Related

PROTOCOL Data

PROTOCOL table maintains audit information such as all security violations are stored, optional details of permitted user activity as specified in USER Records. In addition to this, it can be used to capture the details such as the successful transaction commit, Enquiry executed with selection criteria details, etc.

This table is cleared during every COB process by the job EB.CLEAR.FILES running as part of the every Multi-Company COB in BATCH XXX/FILE.TIDY.UP. Hence any data extraction from F.PROTOCOL table should be done company-wise.

Log File part of T24

The usage and management of log files in T24 are moved to the TAFJ layer. Information logged in following files will no longer be updated in T24 tables but will get logged at TAFJ layer using a generic logger. By default the logging in the following tables are now at TAFJ logs.

Log file directory specified in field LOG.FILE.DIR of OFS.SOURCE

EXCEPTION.LOG.FILE

EB.LOGGING

EB.CONVERSION.EXCEPTION

Monitoring features

tOP is the performance monitoring tool. tOP is built as an add-on to the industry standard Splunk product.

Splunk provides the following features;

1. Captures indexes and correlates real-time data in a searchable repository from which it can generate graphs, reports, alerts, dashboards and visualizations. It will produce software for searching, monitoring, and analysing machine-generated big data, via a web-style interface.
2. Performs real-time and historical search, as well as reporting and statistical analysis.
3. Indexes structured or unstructured textual machine-generated data. Search and analytics operations are specified using SPL (Search Processing Language), created for managing machine-generated big data. Originally based upon Unix Piping and SQL, its scope includes data searching, filtering, modification, manipulation, insertion, and deletion.
4. Logs can also be forwarded to remote machine that has Splunk installed using Splunk universal forwarder

tOP Splunk add-on provides the following Dashboards

- Home (for summary information)
- System Info
- Transaction by Elapsed Time
- Performance Monitor
- Transaction Activity Log

There are also menus for other information such as

- Transaction Statistics
- Services Menu
- System Metrics
- Audit Log
- Administration

Detail information on the tOP functionalities can be found in the User Guide.

Database Deployment

Database Size

Binary XML storage option allows to store the data in a post-parse binary format designed specifically for XML. This option will likely be the best choice for most XML requirements since it offers insertion performance comparable to unstructured storage, yet query and disk space performance that is comparable to structured storage.

T24 uses Binary XML to store the XMLRECORD column. It is proven to help in reduced storage requirement without any adverse impact on performance. Additionally for T24 tables that contains large amount of data compression can be enabled to reduce the size of the table further. Large tables should be identified and compression enabled as part of the implementation.

Multiple Schemas

Oracle database Schema can be setup by T24 multi-company where all FIN and FRP type tables of a particular multi-company can be created and maintained in a separate Oracle schema. In addition to

company-wise schema it is also possible to specify the tablespace for the related database schema. Based on this there will be 1 default schema with its own tablespace and one schema and a corresponding tablespace per entity.

The idea of using multiple schemas will allow SCB to fully partition in the database. Besides this having multiple company-wise tablespaces, will allow SCB to take full advantage of partitioning that can be done from a controller level all the way down to the physical storage for better IO management given T24 is an I/O intensive application.

Note: Company Schema feature is not available with TAFJ architecture and this has been identified as a GAP.

Resource Management

The Oracle Database Resource Manager (Resource Manager) is an infrastructure that provides granular control of database resources allocated to users, applications, and services. The Resource Manager enables you to manage multiple workloads that are contending for system and database resources.

Resources are allocated to users according to a resource plan specified by the database administrator. The plan specifies how the resources are to be distributed among resource consumer groups, which are user sessions grouped by resource requirements. A resource plan directive associates a resource consumer group with a plan and specifies how resources are to be allocated to the group.

The Resource Manager will help SCB to control and limit the CPU, Memory and I/O resources based on the company/entity operations thus able to distribute resources efficiently to support T24 operations for all 34 using a single database instance.

Note: To create a resource plan, database requires certain attributes like `MODULE_NAME`, `SERVICE_MODULE`, etc. to be set as part of every database command sent from the application. TAFJ does not set any such attributes presently. This has been identified as a GAP.

Backup Strategy

T24 system backup is required for creating testing and development environments. This is also required to create ‘production copy’ environment when there is any application related issue in Production that cannot be analysed based on the information provided from Production environment. Most common stages when backups are usually taken are before and after COB process.

In MESI architecture it will not be possible to take a single full system backup covering all entities with all of them in same stage, for example, taking backup before COB of all entities. One option is to take database backup before and after COB for each entity. This will result in 68 backups all entities put together. This creates operational difficulties mainly in time required for each backup, maintaining backup repository, large storage required to store backup files. The following measures can be considered to minimise these challenges

- Backup automation
- Smaller backup by targeting dataset of an entity

Targeted backup by entity should also include all system tables apart from entity specific tables so that restoring this backup will be faster and required smaller storage space. With multiple schemas feature the data will be stored in a dedicated schema and its tablespaces. The system tables (i.e. all INT type tables) will reside in the tablespace of default schema. So when an entity backup is taken the tablespaces of corresponding entity schema plus the default schema should be included.

This concept of entity backup should be pursued with the condition that such backup will be used to create a smaller production copy environment for issue analysis. For development and testing purpose it is recommended to take full system backup during the weekend when COB for all entities are completed for a given business day. The weekend day can most likely be Saturday taking entities located in the Middle Eastern countries where the weekend falls on Friday and Saturday where rest of the world follows Saturday and Sunday weekend.

Recovery Procedure

Temenos expects its customer to setup a resilient, scalable and highly available solution in place to make T24 available at all times. Setting up a Disaster Recovery process is a customer owned activity and Temenos will provide product related inputs to support its customers in this task.

Temenos does not expect or request its customers to do a point in time data recovery in Production for any application related issue. In this case, Temenos Support will provide required inputs to resolve any data issue if any.

Any data recovery procedure if required to be setup must consider the entire landscape in which T24 is integrated and not a specific application. If data recovery procedure planned for any specific system, then all updates from upstream systems and to downstream systems should also be covered to ensure overall data integrity.

Security setup

Security Management System

The Security Management System (SMS) controls who is allowed to use **T24** when they are allowed to use it and to what parts of the System they can have access. It will detect, stop and record any attempt at unauthorised use of the System. SMS can also, if required, record all activities performed by selected Users. Detailed information about SMS can be found in the User Guide.

T24 Browser

The Temenos Browser Servlet is a web application that allows access to T24 through a web browser (HTML) based GUI. It provides access to all T24 permitted business service and it is intended for use by banking operations staff alone. Following are ways to secure the Browser connectivity

- Communication between User browser application and Application server can be secured by implementing HTTPS protocol
- For BrowserWeb WAR and T24 Application being deployed on different application servers refer to the section ‘JMS queue connection’

It is possible to enable Single Sign On mechanism for T24 Browser to avoid maintaining user login passwords in T24.

JDBC Connection

T24 uses JDBC method to connect to the underlying Oracle database. JDBC connections can be secured using Oracle Advanced Security SSL. If SCB has implemented other mechanism to secure the JDBC connectivity, it should not be an issue for T24. However it is recommended to check whether such mechanism would not create any challenge for T24.

JMS Queue Connection

JMS queue communication can be secured using SSL. JBoss and/or the corresponding Messaging Solution documentation should be referred to for details.

Classic access

In TAFJ architecture the classic T24 access (via Telnet/SSH) is not required. All process will be run within JVM in the application server. If for any purpose classic access is used, then the JDBC password will required to be stored in plain text in the corresponding TAFJ property file.

TAFJEE

TAFJ JEE application is packaged within TAFJJEE_EAR.ear and provides the following functionalities

- Set of servlet and utilities
- Webservices to process T24 requests

Some of these features are accessible through Application Server and hence the restrictions should be put in place to who get to access these.

Execute servlet

Execute Servlet is an Execution tools that send message in the EXEC JMS Queue for initiate background processes like TSM. In case of TSM management is automated, then the access to this servlet may not be required and can be blocked.

Logger Servlet

LoggerServlet is provided to change dynamically log level along with access log files. Changing log level can produce adverse impact on the application server if changed without understanding the implication or in an unauthorised manner. Access to this servlet can be blocked since the logger configuration can be updated in the configuration file directly. Viewing log files

DBTools Servlet

DBTools Servlet can be used to execute DB Tools (explained later) commands through the application server data sources. Since DBTools allow access to database directly, the features of this components should be studied in detail so that required access and restriction can be identified and implemented. The utility is available as a console alternatively.

Webservice component

TAFJServices.war is an Axis based archive to provide a Webservice access to OFS and CALL_AT functionalities. These services can be used to post an OFS message directly in T24 or call T24 Subroutines. These features has been marked deprecated and hence should be disabled.

Axis2 Webservice

Axis2.war provides access to T24 from Design Studio through Webservice. T24 Design Studio requires access to T24 environment to retrieve information in most cases and also to publish Event flow, screens and enquiries. However these activities are development related and hence the services available in Production instance should be blocked/disabled.

TWS

Temenos Web Service (TWS) has been enhanced to make use of WS-Security (Web Services Security, short WSS). User Credentials may be provided via the Soap Header. Thus anonymous calls, security breach, unauthenticated users are not allowed to access the T24 System via TWS interface.

The username provided in the SOAP Header is mapped to the web request common. A WSS-header is used to convey the end user's token, eventually making TWS WS-Security compliant. The OFS.SOURCE record in T24 used by TWS should have an attribute value PREAUTHENTICATED.

The communication between the calling system and Application server can be secured by using HTTPS protocol.

IRIS Data Service

The RequestContext filter is a normal element of the web.xml file. The filter:

Captures the UserPrincipal from the HTTP request context

Holds the UserPrincipal so that it can be passed into T24 as the effective User ID

Although it is possible to replace or modify this filter, it is not recommended. The recommended approach to integrate the Web application containing the Data Service with an external authentication mechanism is to wrap the RequestContext in another filter that provides the appropriate UserPrincipal which can be used as T24 User to process the request.

By default, this filter is the T24Authenticator, which checks the Basic HTTP Auth credentials against T24 itself. This can be replaced with a Single Sign On or Spring Authentication method for authentication.

The communication between the calling system and Application Server can be secured by using HTTPS protocol.

T24 Custom Adaptors for IIB

T24 Custom Adaptors for IIB uses remote EJB communication to process requests in T24 for Outbound and retrieve corresponding IF Events for Inbound.

These adaptors does not support secured communication. This is identified as a GAP.

Design Studio

Design Studio is used by various frameworks to design IF Events, Screens, Enquiries, Data Service, etc. This is meant to be used at development stage and hence there is no requirement for Design Studio to have access to T24 Production instance. For all these purposes Design Studio uses AXIS based Webservice to communicate with T24.

DBTools

TAFJ-DBTools Console provides access to SQL / JQL / OFS statements, and integrates various TAFJ tools that deal with database within a unique application.

It is also designed to help users to launch various commands in a quick and efficient way by providing aliases and history functionalities. Results are being displayed with a customizable and friendly approach.

The available functionalities are:

- Execute SQL statements
- Execute JQL statements
- Execute OFS statements
- Execute tJed application (edit and modify record)
- Extract data from database to file
- Load data from file to database
- Show current locks on database
- Release locks on database
- Display statistics on table

Access to DBTools is allowed only using a valid username and password. If there are 3 unsuccessful attempts, user gets blocked and cannot be used further.

This username and password can only be created using the TAFJ utility tAddUser. The username and encrypted password gets stored in the property file within TAFJ file system.

Note: to edit any application data for corrections requires DBTools or tJed.

tJed

TAFJ JED application is designed to edit and modify database records by providing their file name and record key. It could be called from DBTools console apart from being run in standalone mode. This utility will be required in Production environment for any data edit without using T24 application.

tJed can be accessed only with valid username and password. The users to access tJed should be created using the utility tAddUser.

Data Anonymisation

Data Anonymisation allows a client to protect sensitive customer data by:

- Allowing the selective encryption of stored data
- The selective decryption of that data to pre-determined users and groups of users

- System administrators, T24 administrators and Database administrators will not be able to view sensitive data in such a way that is interpretable

Data Anonymisation works by attaching custom encryption routines to the EB.ENC.PARAMETER table.

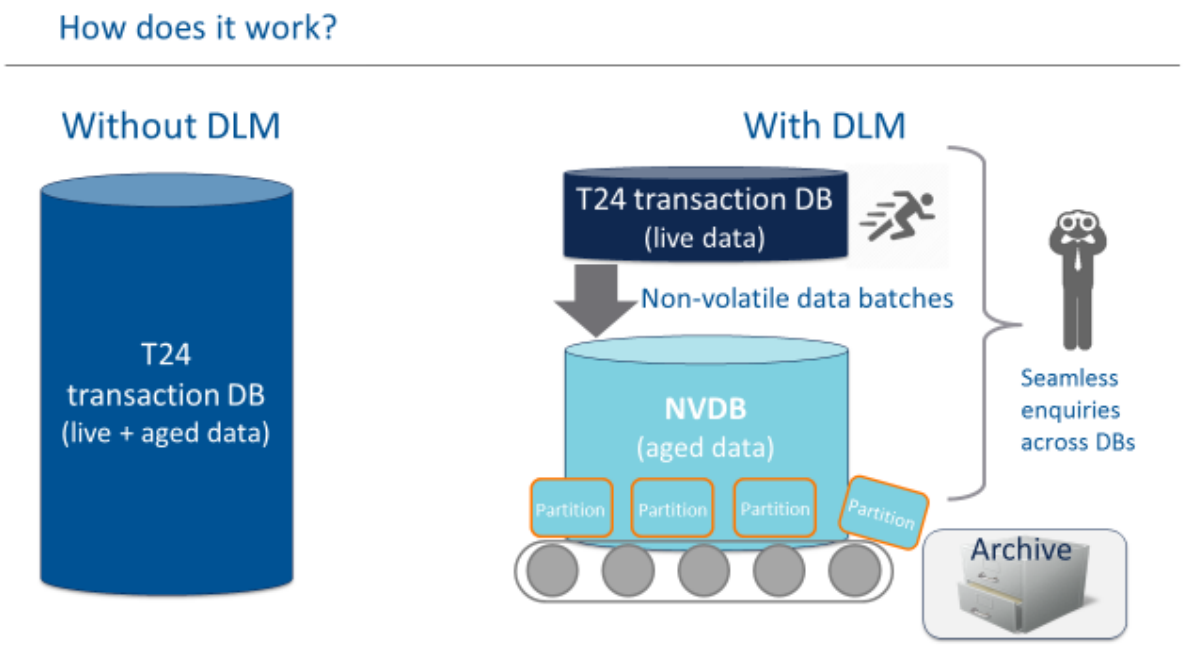
Data Lifecycle Management

In MESI architecture the size of the database become very large very quickly with T24 supporting BO operations for 34 countries. This create massive challenge for Backup and Recovery and indirectly on Performance.

Data Lifecycle Management (DLM) part of Data Framework help to identify non-volatile data in the Live database and move them to a Read Only (RO) database. DLM enable access to all the data as if it were in live, with the additional benefits of Data Lifecycle to manage the data once it exceeds a useful age.

Data movement is automated using the Generic Archive module along with DLM Copy and Purge service. The Purge process deletes data from Live database only after checking if the data is copied to RO database thus ensuring no data is lost at any time.

This helps to reduce the size of the Live database and also implements automated processes to prevent future growth due to data retention. With reduced database size, the backup and recovery process can be improved.



By having a greatly reduced live database size, restore the performance of the database for both online and COB operations. This is achieved through database efficiencies with memory cache rather than directly targeting performance enhancements. Performance optimisation for the RO database can be performed with Partitioning (for Lifecycle Management) and Indexes which can be different to Live.

DLM allows access to both Live and RO database seamlessly using single Enquiry. TAFJ provides the ability for Read Redirection by which a record is read from Live database and if not found then checks the RO database. It also allows the SELECT of data which is split across 2 databases as a single transaction.

For lifecycle management of RO database DBA can manage this with Partition Exchange and moving old partitions to offline storage.

Performance testing

Comprehensive performance testing should be taken up as part of the Enable program given the scale of the business T24 will be supporting covering 34 countries. Some of the high level scenarios that should be covered as part of this activity are

- Simultaneous COB execution for multiple countries
- Simultaneous online transaction load for multiple countries
- Combined COB execution for few countries and online transaction load for another set of countries
- Load balancing and failover at different time like during peak transaction hours, COB, etc.
- Online transaction load should include transactions from interfaces and Enquiry executions

Identification of all required scenarios also depends up on the Application Deployment model to be implemented. Hence this should be discussed in detail to prepare test scenarios and applicable cases.

Other Non-Functional Requirements

Place holder to include any item not covered in the rest of the topics.