

P E R S P E C T I V E

Demand Deposit Account (DDA)
Framework with Proven Resilience



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The impact of low cost demand deposits on the U.S. financial system cannot be overstated. They create liquidity in the economy and enable banks to generate profits as well as comply with statutory reserve regulations. In a January 2008 move that can only be termed prescient, Wachovia launched an incentive program to encourage deposits at a time when personal savings rates in the U.S. were at record lows. The financial crisis broke soon thereafter, driving money from stock-markets and real-estate to safer havens, namely bank deposits. U.S. commercial banks are now flush with funds, with deposits exceeding US \$7.3 trillion, including US \$727.5 billion in checking (demand deposit) and money market accounts in April 2009.

If the 10 percent deposit cap imposed by the Riegle - Neal Interstate Banking and Branching Efficiency Act, 1994 is raised in response to lobbying by the big banks, it could pave the way for another spate of bank acquisitions. That may well see the deposits of the big three – Bank of America, JPMorgan Chase and Wells Fargo - which are already edging the 10 percent mark, take a quantum leap.

Checking or Demand Deposit Accounts (DDA) have been in the spotlight for yet another reason. Citing higher consumer lending risk, banks have started to offset that with higher fees on checking accounts and overdrafts. Despite sharp criticism from analysts and consumers alike, most big banks are set to revise their pricing structure along the lines of the credit card business.

The implication of all these developments is that the management of demand deposit accounts in the U.S. will become more complex – with more money, higher transaction volumes and variegated pricing mechanisms to deal with. At the same time, banks that exceed customer expectations and optimize infrastructure investments have the opportunity to build competitive advantage in this space.

Among other things, a resilient and adaptive technology framework will be integral to U.S. banks' DDA strategy, going forward.

DDA Framework Capability Pre-requisites

Banks' DDA growth strategy must be aligned with their larger business objectives of improving productivity and customer service to stay competitive in a challenging business environment.

That calls for a resilient and scalable technology framework that can efficiently process millions of deposit account transactions over and over again without breaking down. At the same time, the framework must be flexible enough to accommodate changes in deposit products' features or related services and processes, in response to customer expectations. Finally, the solution must be sufficiently versatile in order to handle a vast palette of deposit products, and related aspects including Customer Management, Account Management, Transaction Management, Funds Management and Interest and Fee Management.

DDA Framework Technical Pre-requisites

A versatile DDA technology framework must comply with the following requirements:

- Support a number of Relational Database Management Systems (RDBMS) and platforms
- Support centralized deployment and at the same time facilitate easy integration with other applications within the entire banking organization
- Be highly configurable and parameterizable with flexibility
- Be customizable and extensible
- Interface easily with a host of delivery channels including the branch intranet, Internet, call centers, ATMs, mobiles and kiosks
- Ensure security through various measures including authentication, authorization, and access control
- Support regulatory compliance through a robust audit infrastructure
- Be future proof
- Be highly scalable with the ability to handle both organic and inorganic growth

The Finacle DDA Framework from Infosys

Infosys' DDA framework has all the functional and technical capabilities required to support the



Figure 1: Finacle DDA module – Functional Architecture

end-to-end management of the deposit accounts of U.S. commercial banks.

This is a centralized, Web-enabled new generation framework which is fully integrated, starting from the delivery channels, going right up to the back-end. Its multi-currency, multilingual and multi-entity capabilities lend impetus to banks' quest for universality and customer centricity.

The Finacle DDA framework packs several unique features which enable 24x7 operations, Straight-Through-Processing(STP) across modules and standards based support for multiple delivery channels. For instance, banks can create innovative products in combination with operative accounts, and offer channel accessibility for both accounts and transactions. The powerful 'Finacle Studio' allows banks to customize various deposit products to suit their requirements. The DDA products can also be offered in a 'Direct Banking' mode (without the presence of physical branches), supported from end-to-end.

By virtue of its extensive parameterizing capability, it can support all DDA-related aspects including Customer Management, Account Management, Transaction Management, Funds Management and Interest and Fee Management.

A unique value-addition that differentiates the Finacle DDA framework are the solutions that surround it, such as Finacle Finanz Tools and Finacle Virtual Lounge. These act as robust customer acquisition engines, which also play a significant role in helping the bank to delight and retain them.

Finacle DDA Technical Overview

The solution is built on new generation IT architecture, ensuring openness and easy integration with other applications within the bank. It also eliminates issues of software distribution to and maintenance of clients, and enables significantly better performance over traditional client-server applications.

Designed with Oracle RDBMS on the back-end and currently being ported to IBM DB2, Finacle's DDA framework is tuned on HP, Sun and IBM UNIX platforms and may also be deployed on Linux as a platform variant.

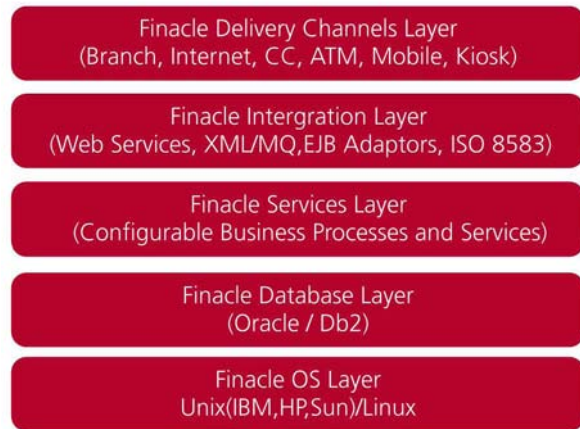


Figure 2: Finacle Technology Layers

To offer true interoperability, it has been opened up at various technology layers:

- **Operating System Layer**
Compatible with both Unix and Linux operating systems, it leverages their file management and system resource allocation capabilities, along with the OS environment to optimize performance. The framework has also been tuned on the variants of these operating systems including HP-UX, IBM-AIX, SUN-Solaris and Red Hat Linux.
- **Database Layer**
The framework supports Oracle RDBMS and is currently being ported to support IBM DB2 as an alternative database. The mode of interaction between the application logic layer and the database layer is through a database library.
- **Services Layer**
The services layer primarily hosts business logic comprising processes and services. This layer exists in the form of application executables or shared objects. These components are deployed within the Finacle operating environment as granular services - for example, account inquiry, account opening, account closure, withdrawal, etc. - and are orchestrated in this layer to form compound services, workflows or processes involving both manual and automated activities. This layer also provides a graphical process designer that is compliant with BPML specifications.
- **Integration Layer**
This layer enables both online and batch integration of Finacle with banks' various backend systems and channels. It allows synchronous

and asynchronous data communication in either direction, while integrating with standard middleware applications or an Enterprise Service Bus (ESB).

The data flowing between Finacle and external back-end systems / channels could be classified as:

- Online interfaces consisting of
 - Inbound messages
 - Outbound messages
- Batch interfaces consisting of
 - Data uploads into Finacle
 - Data extracts from Finacle

The online framework supports integration through Web Services, XML messages over a standard message queue, EJB adaptors and ISO 8583 based messages. The framework also enables message and file format transformation from external formats to Finacle formats.

Delivery Channels Layer

This layer enables DDA products and related services to be accessed through multiple delivery channels, including branches, Internet, call centers, ATMs, mobile phones and kiosks. The layer supports both Finacle channel applications (which provide end-to-end integration with back-end modules), and those provided by other vendors (by integrating them through the Finacle Integration Layer).

SOA-based Architecture

The framework's Service Oriented Architecture makes all business functions available as granular and composite services, which may be orchestrated to form workflows or business processes that can be integrated online with any external application or ESB.

Finacle Online Integrator is modeled as a gateway for external systems and other Finacle modules to exchange data.

- It provides a Universal Service Bus (UBus) infrastructure which enables service requestors to discover and execute a service
- External channels can connect to UBus through WebSphere JMS, Native MQ Series, TIBCO EMS, SOAP/HTTP or TCP/IP based endpoints and execute any service registered with the Ubus

- It provides interface capability with an industry-standard Enterprise Service Bus and Service Registry
- It powers a Service Oriented Architecture by providing a flexible connectivity layer between various Finacle - Finacle and Finacle - Non Finacle end points
- It supports header based routing of messages
- It offers a mapping engine to map external message formats to Finacle message formats

Security Infrastructure

For reasons that are all too obvious, the banking industry counts among those most concerned with security and regulatory compliance. Banks are constantly looking to tighten the security measures at every step of their business processes. A 2007 survey by an industry body showed that over 90 percent of the US \$12 billion attempted check fraud against deposit accounts in the previous year were prevented by banks' security systems. It is imperative that deposit accounts, especially those that turn inactive, be protected against malicious attack.

Taking cognizance of this need, the Finacle DDA framework has been armed with a comprehensive security capability. It can address security aspects from multiple perspectives, including authentication, authorization, access control, OS and DB, and also boasts of a very robust audit infrastructure.

For authentication, the framework comprises Single Sign-On (SSO) infrastructure, which enables seamless access to all Finacle products and modules via a single login mechanism. This is built on a JAAS (Java Authentication and Authorization Services) framework and is extendable to other web based applications that need to use the Finacle SSO infrastructure. At the same time, the solution is also able to work with banks' existing enterprise SSO systems. Dual factor authentication and authentication based on biometric parameters present additional security measures for both internal users and customers as well.

It enables access control at various levels, such as role, user, branch, menu, account and transaction. A powerful multi-level referral and authorization matrix can be used to define authorization controls.

The framework does not need users to directly access either the operating system or the database,

and controls all access from within the application. It supports HTTPS and SSL for all message transmission and is capable of working with multiple encryption algorithms.

The comprehensive audit infrastructure can monitor financial and non-financial transactions, inquiry operations and configuration of business parameters – in other words, the entire gamut of daily operations.

Deployment Features

Accounting for several trillion dollars and high double digit growth, deposit accounts are the lifeline of the U.S. banking industry. Hence, there is no room for any kind of lapse in the administration of these accounts. The deposit management framework must enable banks to centrally control accounts regardless of their size, number or geographic dispersion. Moreover, deposit accounts must be accessible to customers anywhere, anytime via multiple banking modes of delivery.

The Finacle DDA framework can be centrally deployed, allowing delivery channels real-time access to its full functionality on a 24x7 basis. The use of clustering technologies and multiple hardware load balancers ensures uninterrupted availability across 4 tiers comprising the Web Server, J2EE, core C++ and Database. It also enables the setup of a Disaster Recovery site to ensure business continuity in the event of a breakdown at the main production data center.

The deployment of the Finacle DDA framework is characterized by horizontal and vertical scalability as well as high availability.

The key benefits of Finacle deployment are summarized below:

- All transactions (online and batch) are posted directly to the master database on an online real-time basis
- Banks' exposure is eliminated as channel transactions are posted directly into the master files
- Operational processes (cut-over) are separated from accounting processes (book closure)
- A longer time window is available for daily book closure
- Generally, transactions are captured in the order that they are performed. However, there is an option to configure batch transactions to the current or previous date

- Concurrent online and batch processing allows some batch jobs to start earlier

Flexibility And Extensibility

U.S. deposit accounts offer several choices catering to the needs of different customer segments. For example, consider a bank with a retail menu that has a no-frills account, another only for students, and a bundled package of personal and business checking accounts targeted at owners of small businesses. There is another suite of deposit products exclusively for the Government. Like other bank offerings, deposits too need periodic revision or customization in agile response to changing market dynamics. Consequently, the technology framework must be equal to the challenge of supporting quick product and service modification, on a continuously expanding deposit base. Only open solution architecture can endow a deposit management solution with the required flexibility and agility.

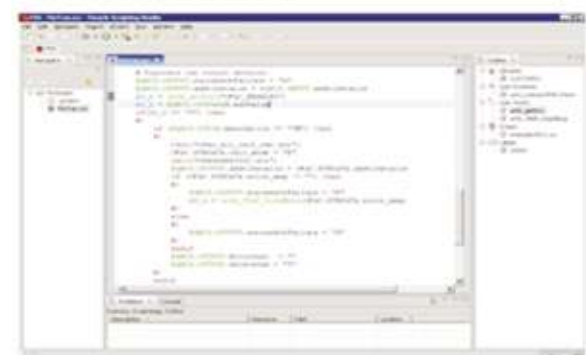
Besides, all customizations would be version independent and can be migrated version after version.

Finacle Studio, with its rich set of GUI-based tools, enables easy customization and extension of the Finacle DDA framework at different levels. The scope of such tailoring includes:

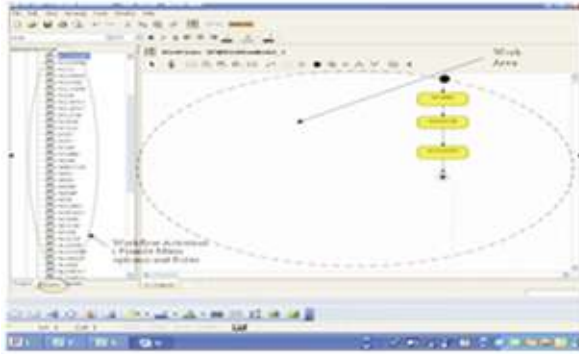
- Business logic (through Finacle scripting studio)
- Business processes and workflows (through Finacle InFlux/PEAS)
- User interfaces (through Finacle visual studio)
- Interfaces with other applications (through Finacle integrator), and
- MIS reports (through Finacle report designer)

The solution can also work with an external enterprise-wide rule engine to add customized

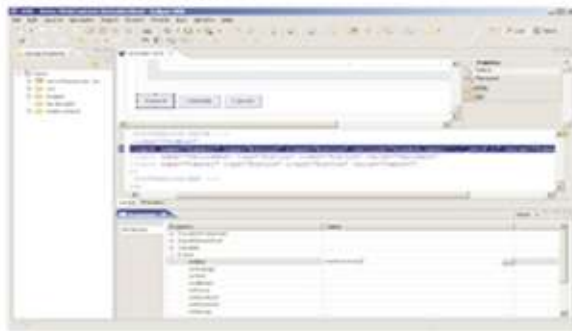
Finacle scripting studio



Finacle InFlux/PEAS



Finacle visual studio



Finacle report designer (Jasper plugin)



Figure 3: GUI based tools for extending Finacle

rules to existing business logic. This is also enabled through the Finacle scripting studio and has been integrated with multiple enterprise rule engines.

Scalability And Performance

An estimated 100 million households in the U.S. have checking accounts. In order to service them, banks' deposit management frameworks must be capable of bearing the load of a staggering number of daily transactions. Speed and reliability are other pre-requisites.

The Finacle DDA framework has been architected from the standpoint of performance and scalability. It has been benchmarked against various parameters such as transactions per second and

number of concurrent users on each of the supported platforms, including HP Itanium, Sun Solaris and IBM AIX.

Recently, Finacle clocked a record throughput translating into 41 million online transactions, 104 million ATM transactions and the processing of 141 million records, all in the space of an hour! Finacle has also been benchmarked to support 130,000 simultaneous users, which demonstrates the scalability of the application.

It is compliant with ARM 4.0 specifications, enabling performance measurement by any ARM compliant enterprise tool.

Summary

U.S. banks, collectively holding over US \$7 trillion in deposit accounts, are highly reliant on their DDA technology frameworks. These solutions must be able to keep pace with the evolution of deposit accounts in terms of number, size, variety and complexity. Moreover, the staggering volume of deposit accounts and related transactions is growing at a sharp pace as customers seek to park their money in safe avenues. Clearly, the efficient management of deposits is dependent on the resilience and flexibility of the technological solution.

Finacle DDA framework offers several key architectural benefits to its customer banks. It has been modeled on a SOA based architecture that helps banks create a future-proof technology platform, which supports adoption of Web 2.0 developments as well. The solution also focuses on customer centricity, and offers a 360 degree view of customer relationships across all products offered by the bank, with up-sell and cross-sell features and enhanced customer servicing capabilities. It offers powerful agility and flexibility features through extensive parameterization and Finacle Studio, which enables the bank to meet aggressive time-to-market parameters for a new product launch. It also enables the bank to differentiate its offerings using unique processing rules that could be set up through business rules engines. From a resilience perspective, Finacle DDA framework offers 24x7 features and high availability capabilities both from the application operation as well as solution deployment perspectives. And most importantly, Finacle offers established and proven scalability which enables your bank to fast-track its growth plans, with the comfort that the underlying Finacle framework has already been proven to support aggressive growth plans, for global players.



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