



ENTERPRISE **CORE BANKING SOLUTION**

Introduction:

EasyBankCore® is an enterprise secured browser-based multi-channel, integrated banking solution that enable banks to deliver seamless digital banking experiences across various channels to their customers. EasyBankCore® is a set of robust functional component that support a wide range of business function within the Digital Banking Environment. EasyBankCore® is capable of providing 24/7 operations with

Digital Channels like ATMs, Mobile , On- Line Net Banking , SMS Banking, Self-Serviced Kiosks etc. Developed with an Oracle database backend , it supports a wide range of LINUX family of servers.



107+ Successful Core Banking Solution Implementations

Technology Stack:

Platform-Server(OS)

- Oracle Enterprise Linux
- Red Hat Enterprise Linux
- HP-UX
- Microsoft Windows®

Client (OS)

- Windows® XP Thin Client
- Windows 7,8,10.
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Architecture

- N-Tier(Browser Based)
- Microservices

Front End

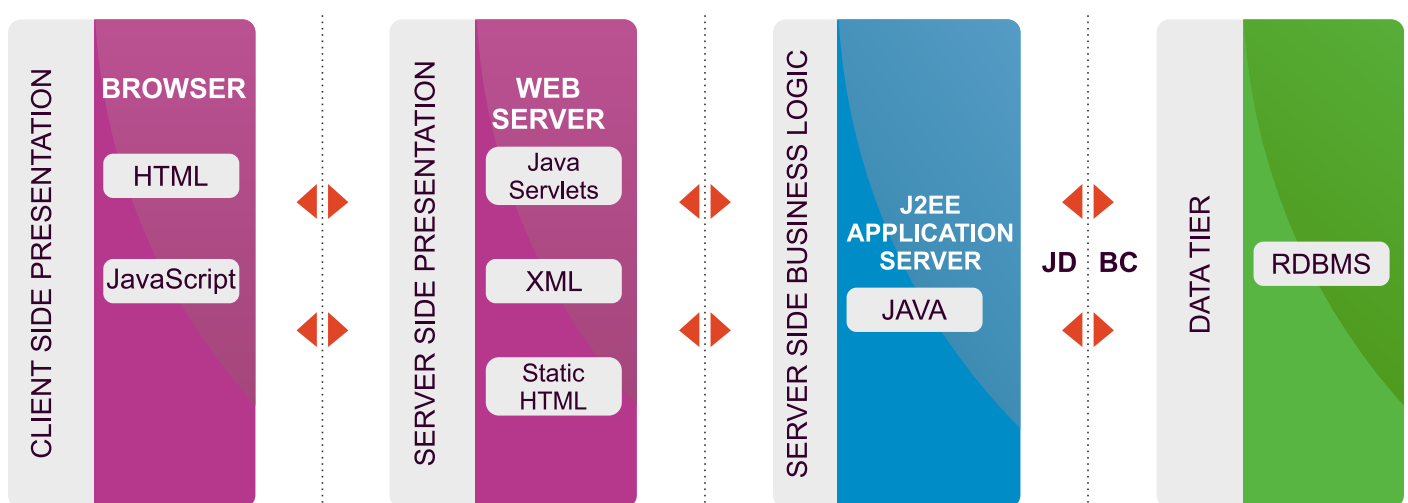
- Java Script
- HTML
- AJAX

Application Server








- JBoss
- WildFly

Back End

- Oracle 11g Release 2 & Higher



Digital Channels

						
ATM	SMS Banking	Net Banking	Mobile Banking	Service Outlet	Kiosk	Call Centre /IVRS

Interfaces

Payment Gateway	Next Gen- RTGS/NEFT Converter	Digital API Management	Personalized Cheque Book
XBRL/ADF	Application Supported by Blocked Amount (ASBA)	National Automated Clearing House (NACH)	ATM HOST ISO 8583 UPI2.0 Compliant
e-KYC , CKYC, CIBIL	Fraud & Risk Management(FRM) with BASEL III Compliance	Bharat Bill Payment System	Treasury Management

Core Modules

Customer Information Management	CASA	Term Deposits	Agricultural Advances (DCCB Specific)
Bank Guarantee	Trade Finance : Letter of Credit/Bills Discounting	Loan Disbursements Repayment Schedule	Standing Instructions
NPA Management	Floating Rate of Interest	Credit Appraisal with userdefined Document Templates	Imaging Module (Multiple Signature Capturing/Verification)
Teller Operations	OSS(1-8)	GST Management	PACS
Limits	Credit Risk Management	Share and Dividend Accounting	Recurring Deposits
PDC Management	Payroll	Remittance/OBC/IBC	Cash/Liquidity Management
Insurance Management	Investment Portfolio Management Tracking (Treasury, Money Market Back Office etc.)	Parameterized Incidental Service Charge Calculation	Document Management System
Banks Account Management & Reconciliation	ALM	Suit File-NPA Recovery(Legal)	Centralized Clearing
Flexi-Deposit	Collateral Management	CIB Data Exchange	Gold Loans
BI-Dash Board	Audit Trail	Parameterized Interest Calculation	Lockers
Stores – Stationery – Inventory Management	Centralized – Internal Audit Management System	E-Circular	Auto Risk Categorization
Sweep In/Out Orders	Fixed Assets Management	Next Gen – RTGS/NEFT (STP)	FI(Financial Inclusion)

Compliance & Reporting

MIS / DSS	Data Warehousing	AML (CTR, STR , FIU India)
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Business Continuity Plan & Disaster Recovery Setup

Server Virtualization	Network Orchestration	SAN Mirroring	Database Replication
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Salient Features:

- ✓ MicroServices/Service Oriented Architecture enables quick deliveries(XML & Webservice)
- ✓ Multi-Currency Enabled
- ✓ Based on 4-Eye Principal & Multi-Level Authorization
- ✓ Sensitive Column Storage in Bcrypt, MD5 & 3DES
- ✓ Operates on minimum bandwidth, 6 to 8 kbps Per User
- ✓ Highly Parameterized System (800+) Parameters Reducing Customization Costs
- ✓ Disaster Recovery Enabled(Real Time Data Replication with Oracle DataGuard/ Golden Gate/ Log Shipping) Effective yet best-of-the-breed solution)with Oracle DataGuard/ Golden Gate/ Log Shipping)
- ✓ Lowest CPAEX & OPEX amongst competition (Cost Effective yet best-of-the-breed solution)
- ✓ Implementation Time crunched by > 75% as compared to competition
- ✓ User-Defined Pass Book Formats, Drafts, Share Warrants etc.
- ✓ Packaged RBI OSS Reports with no additional costs
- ✓ Integrated Scheduler for MIS/DSS
- ✓ Bundled with Extract, Transform & Load (ETL) tool
- ✓ In-built Report Builder for Ad-Hoc Queries/ Extracts
- ✓ Unparalleled Rich GUI & User Friendly Screen designed for Heavy Duty Data Entry & Quicker Operations
- ✓ Rich Internet Application (RIA)
- ✓ Robust Security Framework
- ✓ Supports Two-Factor Authentication
- ✓ Multilingual Enabled
- ✓ Unmatched Team Experience – Implementation & Support
- ✓ Real-Time, On-Line General Ledger
- ✓ Flexible Template based System reduces Vendor's Dependency
- ✓ PDF Report Generation
- ✓ Business Intelligence
- ✓ 650+ Reports & Extracts

Security Management System-EasyBankCore®:



Authentication

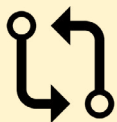
EasyBankCore® uses a Role-based mechanism to maintain user profiles along with password and any other access information required by the user to sign-on to the application. Each User is linked to a particular Template (Role in bank). Each role defines the level

of the user in the Bank (for maker/checker purpose), the tasks that the user can perform, including the data which the user can or cannot see and the time of the day or day of the week, the user can access the system. Some of the imbedded features of the inbuilt Security Management System (SMS) are:

- ✓ System access based on User ID and Password.
- ✓ Globally restricted account numbers.

- ✓ Configurable Password policy that allows the Bank to define the password requirements. The password requirements can be based on parameters such as:
 - Minimum password length
 - Maximum password length (not less than 8 characters)
 - Alpha numeric combination of password
 - Compulsory use of special characters
 - Minimum password age
 - Password expiry period
 - Restricted passwords, Repeat passwords, etc.
 - MD-5 Encryption

- ✓ EasyBankCore® is also capable of exchanging Digital Certificates between client and server.



Connectivity

- Session based activity that does not allow a user to login simultaneously from more than one workstation.

- Configurable inactivity timeouts for sessions

✓ Channel-Server Security

Request through PDA, Mobile comes to SMS/WAP Gateway. PDA, Mobiles use secure WAP protocol for communications.

SMS/WAP Gateway send request using secure "https" to EasyBankCore® Channel Server through Firewall.

ATM use secure ISO8583 protocol with ATM switches.

ATM switches send request using secured TCP to EasyBankCore® Channel Server through Firewall.

✓ Network Security

EasyBankCore® uses secured LAN, WAN and uses JAVA Cryptography Library for encryption.

All the communications happens through multiple levels of Firewall in case of Net Banking.

Protocols used in EasyBankCore® are secured (For example: https, Secured TCP).



Confidentiality

There are a number of controls in limiting access to sensitive information. The controls are based on task access, information access, and access to system generated data.

Authentication information such as a password is stored in an encrypted form(MD-5) in the database.

The database is password protected and can be accessed by designated users only.

Access Control - user level restrictions to prevent operating on certain specified accounts.

Configurable role based menu definition and access control for users.



Accountability

EasyBankCore® implements the maker checker concept (4-eye principle) wherein every transaction as to be authorized by another user with appropriate rights, to take effect. Any maintenance on the control data creates a separate unauthorized record. All the system functions will continue to look at the original authorized record, till the time, the new, modified record is authorized. Only the authorized records are available as control data.

- ✓ Both Local and Remote authorizations are supported. In remote authorization request, the maker can choose the authorizer from the list of authorizers who have been given rights to authorize the class of transaction.

- ✓ The branch supervisor has access to all teller transaction records.

- ✓ To ensure the completeness of the information, the teller batch will not be allowed to be closed if there are pending/unfinished transactions.

EasyBankCore® also maintains a real time Audit Trail for all the activities performed in application such as (addition, modification, mark for deletion, authorization, and inquiry) along with the date & time stamp.

Business Continuity Plan & Disaster Recovery Infrastructure Management:



Server Virtualization:

This is being considered as a very cost effective candidate for DR sites. Instead of having a one-to-one ratio of servers between the primary and DR site, server virtualization allows you to have a one-to-many ratio. Server virtualization allows you to run multiple server applications on the same physical server. Each server application runs on its own desired Operating System, and remains isolated from others. Virtualization software like VMware or Microsoft® Virtual Server make this possible. It creates a virtual layer on a physical server, and let's you setup all your applications on this layer as different virtual machines. Each virtual machine comprises of one server app with its OS. Another advantage of using server virtualization is that it

makes testing before deployment very easy. Once you've created a virtual machine of your main server application, you can create its clone on the same server and test the two for replication and synchronization. Since they're both on the same physical machine, the testing is faster. Moreover, you can quickly start and stop one virtual machine, which is equivalent of booting up or shutting down. This will allow you to simulate server shutdowns very conveniently. Once you're satisfied, you can roll it out at the DR site.



Data Replication

Data replication is the ability to instantly replicate data generated by your applications to remote sites. This is a breath of fresh air over the previous techniques wherein data would first be backed up to tape and then sent to the remote DR site. There are data replication solutions available for a variety of applications, including email servers, databases, and even file servers.

The data could also be replicated remotely to the DR site, either synchronously or asynchronously.



SAN Mirroring

Using SAN mirroring, any data that is changed on the production site (including the version of software) is copied to a mirrored SAN on the DR site. On the backup site, servers (application as well as database) with configuration identical to the production servers are kept pointing to the mirrored SAN. Thus, if the production site goes down, the DR site assumes the role of the primary and logs all the changes (transaction data, etc) until the primary site is restored. This approach is higher in cost and requirement of bandwidth, but provides for a complete failsafe mechanism for disaster recovery.

Database Replication

The approach consists of two parts: Database server and Application/Branch server. For the database server, Disaster Recovery is implemented using replication features provided by the RDBMS employed (Data Guard , Golden Gate from Oracle). For an application server, the latest software has to be installed in the backup site with servers having same configuration as the production servers.

Acute's proposed disaster recovery infrastructure system

architecture for banks is depicted in the following illustration, which, in turn, is divided into three main environments:

1. Production Environment
2. Disaster Recovery Environment
3. Development, Test and Training Environment

1. Production Environment

The Production environment consists of the following:

Main Server

The main database server for the Bank solution would reside on a database server with a chosen combination of Operating System and Database Management System. The suggested EASYBANKCORE® environments are designed for high availability with target availability of 99.99% in order to meet highest levels of service.

The proposed main server is capable of handling both current and target business volumes of Bank. Its scalability architecture is also capable of handling the Bank's regional expansion through either vertical expansion by easily adding

more processors or horizontal expansion by implementing a clustering approach.

Load Balancing

Load Balancing will be used to balance the transaction workload coming from all delivery channels. There could be two Load Balancers implemented at the production site, where it can automatically take over the load balancing function if one of the Load Balancer servers is failing.

2. Disaster Recovery Environment

The infrastructure architecture for the Disaster Recovery System is similar to the Production System, wherein there will be a Main Server for Core Banking, Load Balancing, and Disk/Tape subsystems.

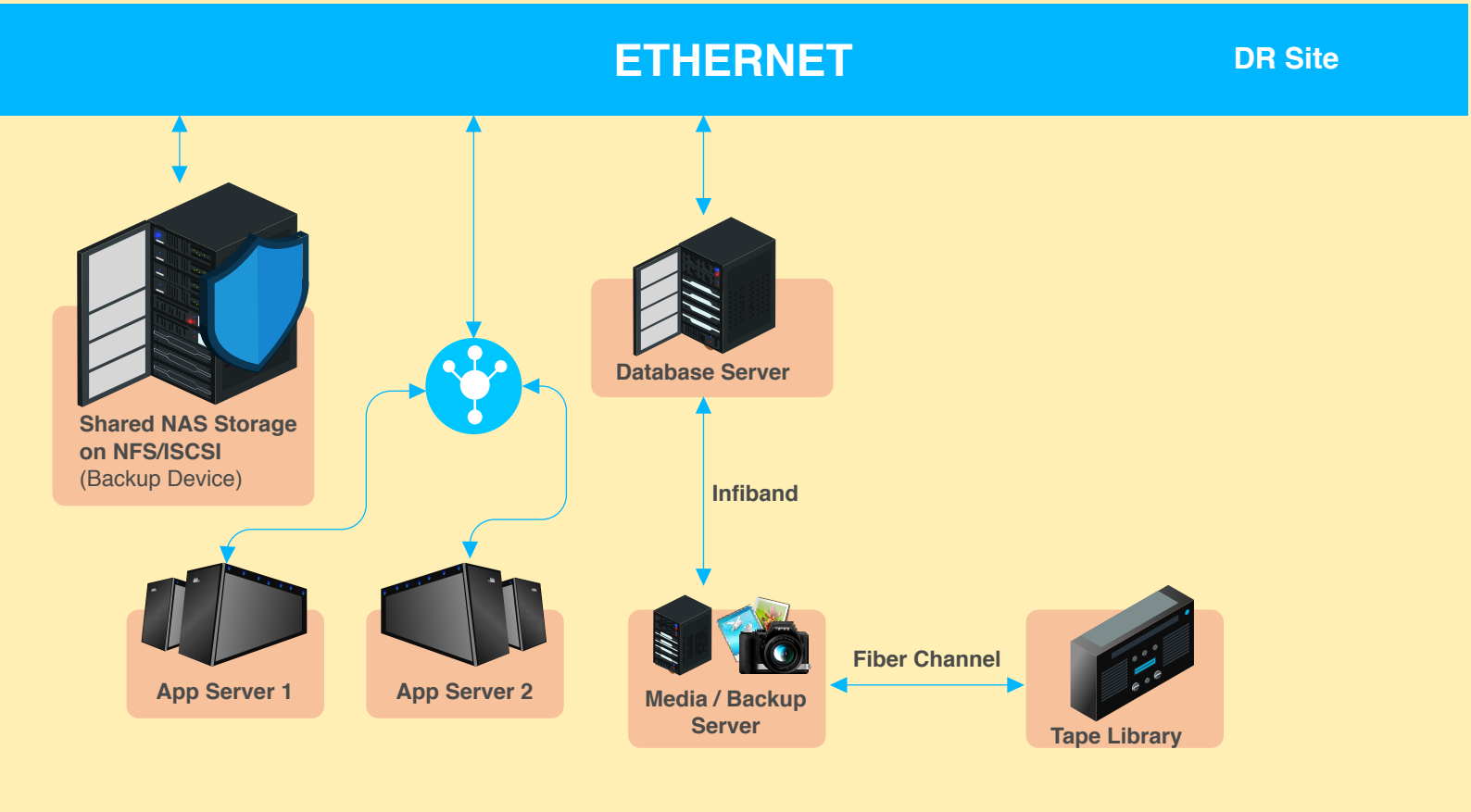
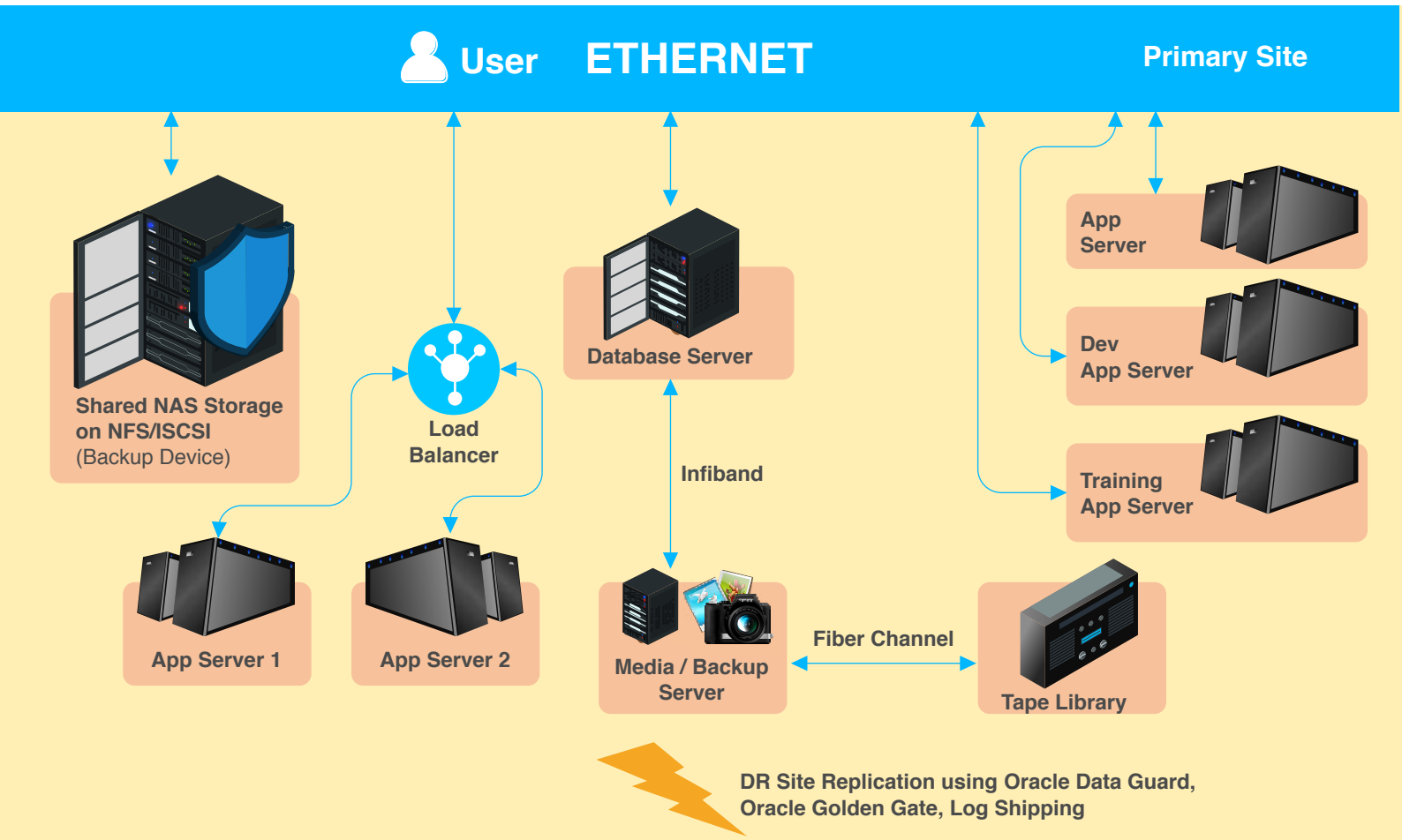
The following diagram shows the proposed disaster recovery approach to be implemented for the Core Banking solution.


The approach is to equip the data centre at the production site to support the production operations of the

Bank, and the disaster recovery centre to be equipped to support the production environment for entire bank.

This way, the Bank can ensure that all data written to disk at production site will have an exact copy at the DR site.

Implementing our DR approach also has the added benefit of laying the groundwork for a workable production and DR solution.



3.  **Development, Test and Training**
To support the successful delivery of the Core Banking up to the rollout implementation, Acute recommends a EASYBANKCORE[®] Development, Test, and Training Environment as part of our repeatable Core Banking Implementation Methodology.

The EASYBANKCORE[®] Development, Test, and Training Development environment is a dedicated hardware and software environment for running EasyBankCore[®]. This environment also interfaces to the existing Bank's Development environment for doing development and testing for the overall integration of the system.

The EASYBANKCORE[®] Development, Test and Training Environment are divided into three logical partitions:

Development Environment

There are several Development Environments to be set-up during the development stage, which covers the non-core development of each line of business (e.g. Deposit, Loan), Interface development and data conversion / migration.

Training

This environment provides the core banking solution and its related product training facility for audiences ranging from Executive, Core Team, Train-the-Trainer (T3), and End-user.

Testing

There are several Testing Environments to be set-up during the testing stage, which covers the Functional Test, System Test, Integration Test and User Acceptance Test of the overall core banking solution. The final User Acceptance Testing environment is the environment to be migrated to the production environment.

Recovery Mechanisms

Listed below are the recovery mechanisms for various components of the solution.

Recovery mechanism in EASYBANKCORE[®]

All Online Transactions follow the Store and Forward Mechanism. In its layered Architecture all layers receive and respond to message using parameterized time outs. EASYBANKCORE[®] maintains atomicity using Auto Reversals generated by its sub system and / or Online Servers. This ensures atomicity, reliability and completeness of a unit of financial transactions [ACID]. All Online Servers ensure that they service pending transactions and carry on from the stage where it left the transaction in its previous working stage.

Batch Operations like EOD, BOD and Clearing also have built in Mechanism of recovery and non-duplication. They have a restart logic built into it, which allows the system to keep track of the point at which the Batch Operation last stopped (due to Hardware / Software problems). Transactions from Branches can be tanked or stored in the Branch Database Server in case of the Branch working in Offline Mode. When the connectivity between the Branch and Host is restored, transactions can be flushed out of the tank to the EASYBANKCORE[®] Host Server.

Recovery Mechanism in Oracle

Oracle has an inbuilt mechanism to recover from any given state using its transaction logs. To ensure uninterrupted operations using Oracle Replication can be used.

Recovery Mechanism using Hardware / Software

There are various means to achieve recovery of data and files using a combination of Hardware and Software or individually. Hardware mirroring is one such option wherein the Hard Disk of the Application Server and Database Server is mirrored. In the event of one of the Machines going down the mirrored machine takes over. Using Redundant Array of Independent Disks (RAID) technology is another option.

The data can be stored in External RAID devices. This can be either RAID 0 + 1 or RAID 5. This ensures availability to the system at all times. Acute's state-of-the-art Disaster Recovery architecture is based upon industry standards and best practices providing you a robust solution that enables recovery from unplanned outages within a small mean time.

Sample Implementation Plan(Core Banking Solution):

Sr.No.	Activity	Deliverables
1.	Infrastructure (Data Centre) hosting and environmental software installation, Setting up Servers, Application Servers ,Security Infrastructure setup	Successful installation of Operating System on DB & App. Servers ,Network Setup, Security infrastructure and parameter set-up.
2.	Conducting gap analysis and System Requirement Specification study	Detailed sign-off customization specification document with Prototypes, Business Validations , Processes etc.
3.	Product Customization	Customized version in line with Bank's requirements
4.	Data Migration	All the Data from the legacy system from day 1 in new Proposed system vetted by Bank's team
5.	System Testing	Detailed Test cases & validations, Load testing after Data Migration
6.	UAT Set Up & Final UAT testing	Re-testing of incidents reported if any and Sign-off on successful completion of UAT testing
7.	Core team Training	Re-testing of incidents reported if any and Sign-off on successful completion of UAT testing
8.	Product Customization Release , Fine Tuning of the S/w, DB tuning after Data Migration	Final version Release & Sign off
9.	Parallel run with 1 Pilot Branch & Cut Off to Live	Final Modifications as per change request based on actual user experiences
10.	Switch over to LIVE Application	Project Sign off
11.	BCP/DR	Data Replication between Primary & DR Site.

Case Study:Core Banking Solution



The Ahmedabad Mercantile Co.-Op. Bank Ltd.

The Ahmedabad Mercantile Co-op. Bank Ltd., Established in the year 1966, popularly known as "AMCO BANK" started its banking activity under the leadership of Shri Mohanbhai C. Patel with one branch at Relief Road, Ahmedabad in Gujarat State, India.

Expansion accelerated, and branch after branch was added to the family of branches of the Bank, creating a group of 34

branches(including Dehgam,Baroda, Surat and Mumbai) most of them operating in their own fully air-conditioned premises. With opening of a branch in Mumbai, in Maharashtra, the Bank attained the Multi State Co-op. Society status. The Bank acquired Scheduled Bank status in 1996.The Bank has also acquired Foreign Exchange License under AD CATEGORY-I w.e.f. 01/04/2016.

Key Benefits

- ☑ Centralized Browser-based Banking Solution (N-Tier Architecture).
- ☑ Bank's expectation of a complete central 360-degree view of customer data realized.
- ☑ Enables Thin Client Support resulting in increased hardware efficiency & low recurring costs.
- ☑ Cost-Effective yet Best-of-the-Breed solution.
- ☑ Unparalleled Rich GUIs, Quick Throughput & Faster Response on Low Bandwidth (128Kbps per branch).
- ☑ Consolidated ALM, AML, OSS , MIS & Regulatory Reports.
- ☑ Seamless Legacy Data Migration to new Core Banking System.

Technology

- ☑ JAVA/J2EE
- ☑ Oracle 10g R2 - Enterprise Edition - Oracle Enterprise Linux
- ☑ Disaster Recovery with Oracle Data Guard
- ☑ Active/Passive Clustering
- ☑ OVM(Virtualization)

About Acute Informatics Pvt. Ltd.

Acute Informatics is CMMI Level 3 assessed & an ISO/IEC 27001:2013 certified Indian IT consulting company headquartered in Ahmedabad(Gujarat).

Our team of dedicated and highly competent professionals is making our mission statement a reality. In a short span the company has made a strong presence into the niche market of Core Banking Solutions(CBS) , Micro-Finance, Enterprise Resource Planning (ERP), Point-of-Sale (POS) software, Database Administration & Systems Integration services. In

tune with the spirit of fast change of IT industry, our team is always working to develop systems that match the latest in the technology while adapting best business practices.

One of our latest offering is the most advanced stage Platform Independent Core Banking Solution. The technology will match the modern banking practices while helping banks connect their branches online with great ease



MISSION

We believe in creating better opportunities for our customers, business associates & employees.

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