

Core Banking Systems

Module 4: Traditional Digital Finance — Lesson 38

Digital Finance

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- Define core banking systems and their critical functions
- Contrast legacy mainframe architectures with modern cloud-native designs
- Identify major core banking vendors and their market positions
- Understand modernization strategies and migration challenges

What is Core Banking?

Definition: Centralized system managing accounts, transactions, and customer data

Core Functions

- Account management
- Transaction processing
- Interest calculation
- General ledger
- Customer information
- Product management

Key Characteristics

- Real-time processing
- Multi-currency support
- Regulatory compliance
- Audit trail
- High availability (99.99%+)
- Security and access control

Integration Points: Channels, payments, lending, risk, regulatory reporting

Upstream Systems

- Online banking
- Mobile apps
- ATM networks
- Branch systems
- Contact centers

Downstream Systems

- Payment rails (SWIFT, ACH)
- Card processing
- Loan origination
- Risk management
- Regulatory reporting

Middleware: Enterprise service bus (ESB), APIs, message queues

Characteristics

- COBOL/PL/I languages
- Batch processing overnight
- Monolithic architecture
- Green-screen interfaces
- Decades-old codebase
- High operational cost

Challenges

- Talent shortage (COBOL)
- Inflexible product launch
- Integration complexity
- Vendor lock-in
- Maintenance burden
- Regulatory adaptation

Reality: 70% of global banks still run mainframes (2024), processing 80%+ transactions

Strengths

- Proven reliability
- Transaction throughput
- Data consistency
- Security track record
- Regulatory compliance
- Sunk cost investment

Migration Risks

- Business disruption
- Data integrity issues
- Customer impact
- Regulatory approval
- Cost overruns (2-3x budget)
- Timeline delays (5-7 years)

Case Study: TSB migration disaster (2018), 1.9M customers affected, £330M cost

Principles: Modularity, API-first, cloud-native, microservices

Design Patterns

- Microservices
- Event-driven architecture
- RESTful APIs
- Containerization (Docker/K8s)
- DevOps/CI-CD

Benefits

- Rapid product launch
- Scalability on demand
- Lower TCO (30-40%)
- Modern tech stack
- Agile development

Technology: Java/Python, PostgreSQL/MongoDB, Kafka, Kubernetes, AWS/Azure

Cloud Deployment Models

- Public cloud (AWS, Azure, GCP)
- Private cloud
- Hybrid cloud
- Multi-cloud strategy

Cloud Advantages

- Elastic scalability
- Pay-per-use pricing
- Global availability
- Disaster recovery
- Continuous updates

Regulatory Considerations: EBA outsourcing guidelines, data residency, exit strategy

Legacy Leaders

- FIS (Systematics, Profile)
- Fiserv (DNA, Premier)
- Oracle (Flexcube)
- Temenos (T24 Transact)
- Infosys (Finacle)

Modern Challengers

- Mambu (SaaS)
- Thought Machine (Vault)
- nCino (Salesforce-based)
- 10x Banking
- Avaloq (wealth focus)

Market Size: \$15B+ annually (2024), growing 8% CAGR

Market Leader: 3,000+ banks, 1.2B+ accounts, 150+ countries

Features

- Component-based architecture
- Multi-entity support
- Pre-built products
- Omnichannel integration
- Cloud-native (2020+)

Deployment Options

- On-premise
- Private cloud
- Temenos Cloud (AWS)
- SaaS model

Technology: Java, TAFC language, SQL/NoSQL, Kafka, Kubernetes

FIS Portfolio

- Profile: Large banks
- Systematics: Community banks
- IBS: Corporate banking
- Revenue: \$15B (2023)
- 500+ bank clients

Fiserv Portfolio

- DNA: Digital-native
- Premier: Regional banks
- Signature: Community banks
- Revenue: \$18B (2023)
- 12,000+ clients

Consolidation: FIS acquired Worldpay (2019, \$43B), Fiserv acquired First Data (2019, \$22B)

Model: Pure SaaS, no on-premise deployment, API-first

Differentiators

- Composable architecture
- Rapid deployment (weeks)
- Modern tech stack
- No legacy constraints
- Usage-based pricing

Target: Greenfield banks, fintechs, embedded finance

Clients

- Neobanks (N26, OakNorth)
- Fintechs
- Digital banks
- 200+ clients globally
- \$3B valuation (2021)

Positioning: Next-generation core, cloud-native from inception

Architecture

- Microservices
- Smart contracts for products
- Event sourcing
- Kubernetes-native
- Multi-cloud support

Funding: \$1B+ raised, \$2.7B valuation (2022), backed by Nyca, Eurazeo

Clients

- Lloyds Banking Group
- Standard Chartered (Mox)
- JPMorgan Chase
- Curve
- SEB

Big Bang Replacement

- Complete system swap
- Single cutover weekend
- High risk, high reward
- 12-36 months timeline
- Example: Metro Bank (2010)

Gradual Migration

- Product-by-product
- Run legacy in parallel
- Lower risk
- 5-7 years timeline
- Example: DBS Bank

Hybrid: New products on modern core, migrate legacy gradually

Strangler Fig Pattern

Strategy: Incrementally replace legacy by routing new functionality to modern system

Steps

- ① API facade over legacy
- ② Route new features to modern
- ③ Migrate data incrementally
- ④ Decommission legacy modules
- ⑤ Repeat until complete

Advantages

- Continuous business operation
- Lower risk profile
- Incremental investment
- Learning by doing
- Easier rollback

Duration: 3-5 years typical, allows parallel operation

Data Migration Challenges

Complexity: 30-40 years of customer data, multiple systems, format inconsistencies

Data Issues

- Schema mismatches
- Data quality problems
- Historical transactions
- Regulatory retention
- Customer consent

Migration Techniques

- ETL pipelines
- Data validation
- Reconciliation
- Parallel run testing
- Rollback procedures

Best Practice: Migrate 80% data, keep 20% in archive for queries

Regulatory Approval

- Change management process
- Regulator notification
- Risk assessment
- Business continuity
- Data protection impact

Compliance Requirements

- Audit trail preservation
- Data residency
- Operational resilience
- Outsourcing guidelines
- Recovery time objectives

EBA Guidelines: Outsourcing to cloud (2019), ICT risk (2020), operational resilience (2021)

Banking as a Service: Core banking capabilities exposed via APIs

BaaS Providers

- Solaris (Germany)
- Railsr (UK)
- Synapse (US)
- Cross River Bank
- Green Dot

Use Cases

- Embedded finance
- White-label banking
- Fintech enablement
- Corporate banking
- Marketplace lending

Market: \$25B+ by 2026, driven by open banking and embedded finance

Vision: Assemble banking from best-of-breed microservices

Components

- Core ledger (Vault)
- KYC/AML (Onfido)
- Payments (Stripe)
- Cards (Marqeta)
- Lending (Plaid)

Benefits

- Flexibility
- Faster innovation
- Avoid vendor lock-in
- Cost optimization
- Scalability

Challenge: Integration complexity, data consistency, vendor management

AI Use Cases

- Fraud detection
- Credit decisioning
- Customer service (chatbots)
- AML transaction monitoring
- Personalized offers

Automation

- Robotic process automation
- Reconciliation
- Regulatory reporting
- Account opening
- Loan processing

Impact: 30% cost reduction potential, 50% faster processes

- Core banking systems are the backbone of bank operations
- Legacy mainframes persist due to reliability but hinder innovation
- Modern cloud-native systems offer agility and lower TCO
- Major vendors: Temenos, FIS, Fiserv (legacy); Mambu, Thought Machine (modern)
- Modernization strategies range from big bang to gradual migration
- Data migration and regulatory compliance are critical challenges
- Future trends: BaaS, composable banking, AI-driven automation

- Accenture (2021). *Banking Technology Vision*. Accenture.
- Gartner (2023). *Magic Quadrant for Global Retail Core Banking*. Gartner.
- McKinsey (2020). *Rewriting the Core: Modernizing the Heart of the Bank*. McKinsey.
- EBA Guidelines on Outsourcing to Cloud Service Providers (2019)
- Thought Machine White Paper: *The Case for Cloud-Native Core Banking* (2021)