Core Banking Systems

Module 4: Traditional Digital Finance — Lesson 38

Digital Finance

January 3, 2026

Learning Objectives

- 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

Source: Financial industry data and regulatory publications

What is Core Banking?

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

Core Functions

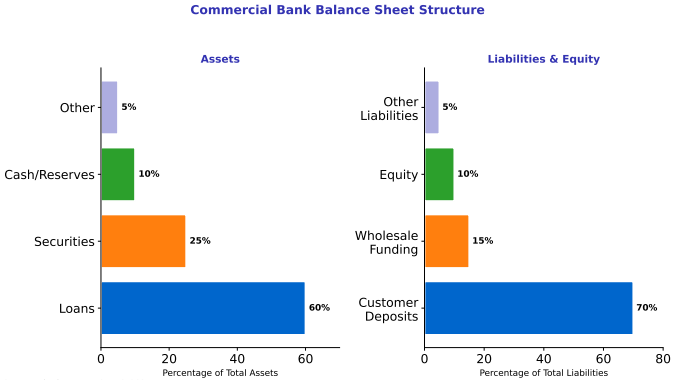
- Account management
- Transaction processing
- Interest calculation
- General ledger
- Customer information
- Product management

Key Characteristics

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

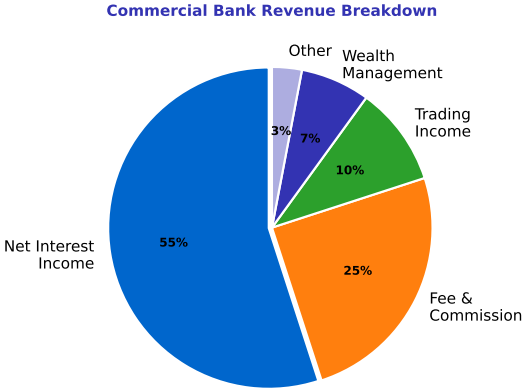
Clear definitions are essential for understanding complex technical concepts.

Bank Balance Sheet Structure



The balance sheet reflects core banking's role in managing assets and liabilities.

Bank Revenue Sources



Source: FDIC, Federal Reserve, McKinsey

Net Interest Income (NII) = Interest earned on loans - Interest paid on deposits

Core banking systems support multiple revenue streams through product management.

Core Banking Ecosystem

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

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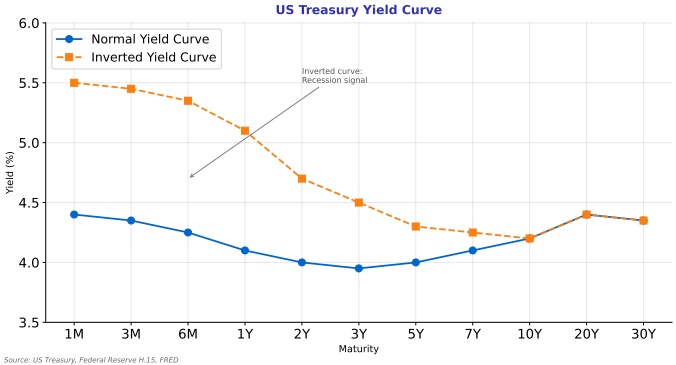
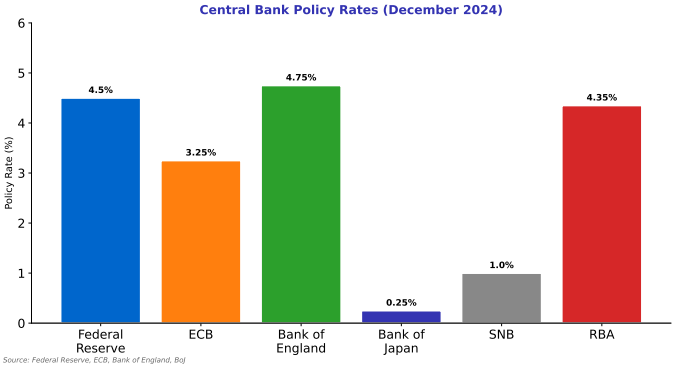
Banks play a central role in the financial system as intermediaries.

Interest Rate Yield Curves



Core systems must handle complex interest calculations across the yield curve.

Central Bank Policy Rates



Policy rates influence pricing models embedded in core banking products.

Legacy Mainframe Systems

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

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AI and ML are transforming financial services through automation and prediction.

Why Legacy Systems Persist

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

Source: Financial industry data and regulatory publications

Modern Core Banking Architecture

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

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Cloud-Native Core Banking

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

Banks play a central role in the financial system as intermediaries.

Major Core Banking Vendors

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

Banks play a central role in the financial system as intermediaries. [Source: Federal Reserve, ECB 2024]

Temenos T24 / Transact

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

Source: Financial industry data and regulatory publications

FIS and Fiserv

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)

Source: Financial industry data and regulatory publications

Mambu: Cloud-Native SaaS

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

Differentiators

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

Clients

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

Target: Greenfield banks, fintechs, embedded finance

Source: Financial industry data and regulatory publications

Thought Machine Vault

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

Architecture

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

Clients

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

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

Source: Financial industry data and regulatory publications

Core Banking Modernization Approaches

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

Banks play a central role in the financial system as intermediaries.

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

Source: Financial industry data and regulatory publications

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

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Understanding limitations helps identify appropriate use cases and avoid over-engineering.

Regulatory and Compliance Considerations

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)

Source: Financial industry data and regulatory publications

Embedded Banking and BaaS

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

Banks play a central role in the financial system as intermediaries. [Source: CB Insights, Statista 2024]

Composable Banking

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

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AI and Automation in Core Banking

AI Use Cases

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

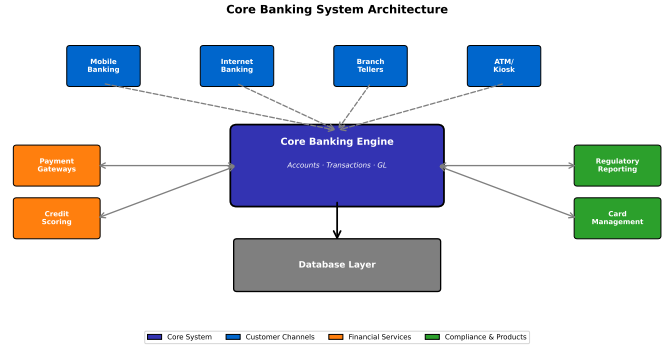
Automation

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

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

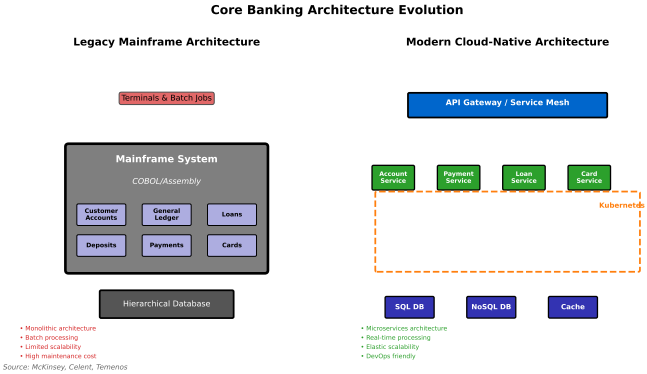
AI and ML are transforming financial services through automation and prediction.

Core Banking System Architecture



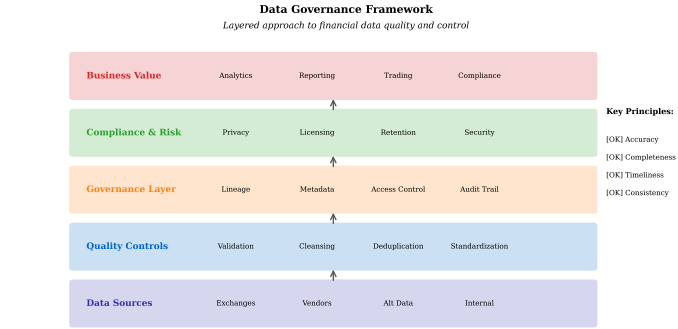
Core banking systems manage accounts, transactions, and customer data at the heart of banks.

Legacy vs Modern Core Banking



Modern core banking systems offer greater flexibility and lower costs than legacy mainframes.

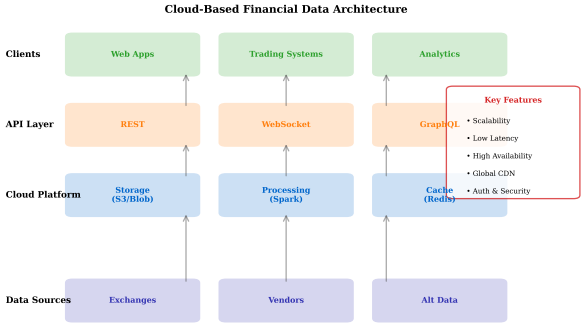
Banking Data Governance Framework



Source: DAMA, EDM Council, BIS BCBS 239

Robust data governance is essential for regulatory compliance and data quality.

Cloud and API-Based Architecture

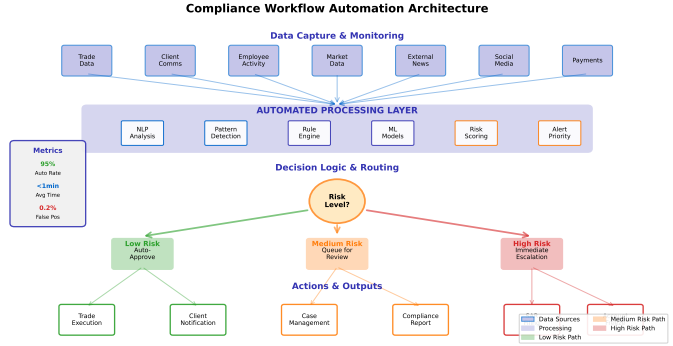


Modern vendors migrate from on-premise terminals to cloud-native API platforms

Source: AWS, FINOS, Martin Fowler (microservices.io)

Cloud-native architectures enable faster innovation and scalability.

Regulatory Compliance Workflow



Automated compliance workflows reduce manual effort and regulatory risk.

Core Banking: Key Takeaways

- 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

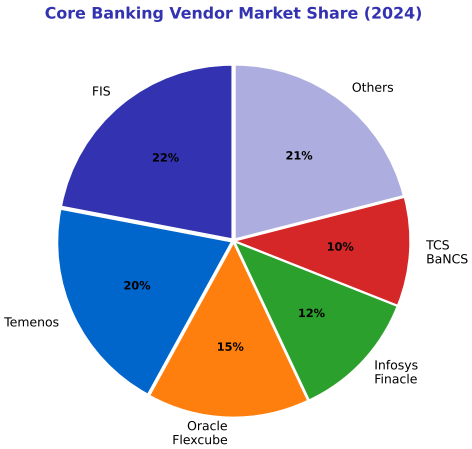
Core banking modernization enables fintech innovation and competitive advantage.

Further Reading

- 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)

Source: Financial industry data and regulatory publications

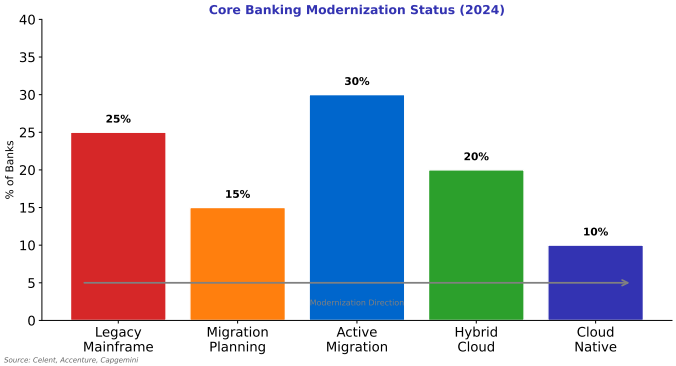
Core Banking Vendor Landscape



Source: IBS Intelligence, Gartner, Celent

Market consolidation among major vendors.

Core Banking Modernization



Cloud migration accelerating across the industry.