FIS Profile® Core Banking Solution

Fast and Flexible…
Setting the Pace for Core Processing Systems

Published April 2017
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FIS Profile Core Banking Solution

This publication highlights many of the benefits and features offered by the FIS™ Profile® core banking solution, including key differentiators which enable the fast and flexible FIS Profile solution to set the pace for Core Processing Systems worldwide.

Setting the Pace for Core Processing Systems

FIS Profile is a real-time, multi-currency deposit and loan core banking system. Developed as a single integrated solution, Profile provides a multitude of configurable features designed to meet the unique business and product needs of individual retail and commercial financial organizations. Profile supports an international installed base of hundreds of institutions, spanning more than 25 countries and ranging from de novo start-ups to top-tier global banks. The Profile core banking solution offers industry-leading total cost-of-ownership benefits based on lower infrastructure and ongoing operating costs, as well as increased productivity. Profile’s proven scalability and high availability make it a premier choice for organizations committed to implementing a 24/7, always-on solution.

• Reduced total cost of ownership (TCO) and increased efficiencies
  Banks and other financial institutions often use many discrete, interfaced applications to support their retail products and services processing systems. This is an expensive situation. Industry analyst firm Financial Insights estimates that core banking consumes more than 12 percent of a bank’s total IT budget, with more than half of that amount spent maintaining aging systems and all the points of connectivity across the organization. FIS Profile represents an opportunity to greatly reduce TCO while modernizing and increasing efficiencies: Internal statistics indicate that the TCO for the FIS Profile real-time core banking solution can be 60 percent less than operating and maintaining legacy batch systems.

• Improved time to market and enhanced competitive innovation
  Overcoming technical obstacles to business innovation is paramount for competitive advantage in the Banking industry. Product and service innovations are often hampered by the technical limitations of legacy environments. Large, global institutions may spend months implementing code changes to numerous legacy back-end and peripheral systems to support the launch of a single new product or service. In contrast, the highly configurable and integrated FIS Profile system can launch new products and services within days.

• Decreased risks and costs to support real-time payment systems
  In legacy environments, batch and day-two processing are embedded within many U.S. payment processes. In addition to the costs to process these transactions, banks are continually confronted with potential risks and errors due to inconsistent exception processing. Many European and Asian institutions moving into the U.S. market are unencumbered by these legacy limitations and can readily support real-time payments with automated exceptions processing.

• Consistent, real-time customer experience across multiple delivery channels
  Profile provides integration with all delivery channels through event-based services architecture. This architecture supports access to all Profile functionality through multiple industry standard interfaces including RESTful services, XML, JDBC, and RPCs that expose the Profile service classes, allowing clients to communicate via SQL. FIS adopted the Integrated Financial eXchange (IFX) message standard for all banking applications and implemented the Profile Web Services interface through this standard. Web
Services offer new and improved ways to design and address business requirements that leverage IT investments and create more agility in your organization.

- **Business agility and competitive advantage**
  The built-in Profile Product Factory is designed to help you dynamically adapt to changing demands for new products and services. The system’s highly granular design enables you to interactively assemble new products without the need for application development. The assembly process leverages an inventory of financial objects that can be used within any product category. In Profile, features are not locked into a “vertical” product application or predetermined functional area. As new features and regulatory requirements are developed and deployed, they instantly become available across all product categories. Features can be individually modified through bank-defined overlays, right down to the individual account or customer level.

- **Growth without business interruption**
  Profile is a proven, highly scalable, real-time system that is exemplified by published benchmarks that exceed 3,000 transactions per second with sub-second response time. Profile’s production installations support millions of accounts worldwide, including one Profile production instance with more than 40 million accounts. The unique availability of logical multi-site (LMS) architecture supports true 24/7 capabilities; this greatly reduces operational risk and creates an *always-on* solution for you and your customers. With LMS, institutions can run multiple simultaneous copies of the database in geographically dispersed locations; the system can automatically switch to a remote site nearly instantly, recovering at the point of the last database transaction.
Differentiators

For financial institutions, the choice of a core banking system is key.

■ As the **transaction engine**, the system controls the quality and breadth of services you can offer your customers.

■ As a **product factory**, the system determines your ability to respond to evolving and dynamic customer and market demands.

■ As an **information repository**, the system defines the quality and accuracy of your management reporting.

The FIS Profile solution enables you to provide superior banking products and services to your customers. This is accomplished in real time, with a low total cost of ownership, extensive flexibility, superior scalability, and high levels of productivity. The system gives your organization real-time operational and management information, and continuously evolves to incorporate technical and functional improvements. Importantly, FIS Profile eliminates the functional, informational, and delivery boundaries that seem all too common in today’s financial services industry.

Notable features and differentiators include the following:

- Customer-Centric Design
- Integrated Product Factory
- Product Packages and Agreements
- Modular Deposit and Loan Processing
- Debit/ATM Card Issuance and Transaction Processing
- Compliance and Regulatory Reporting
- Massive Scalability
- Multi-Platform Support
- Multi-Channel Architecture
- Service Oriented Architecture
- API Gateway, Management, and Analytics
- Profile Web Services
- Float, Funds Availability, and Posting Priority
- Flexible Processing Schedules
- Continuous Processing
- Real-Time Business Continuity
- Real-Time Reporting and Analytics
- FIS Integrated Solution
- Integrated Third-Party Solutions
- Flexible Delivery/Deployment Models
- Implementation Services
Customer-centric Design

FIS Profile’s customer-centric design supports the full spectrum of retail and commercial customers and enables banks to make decisions based on an entire customer relationship.

In Profile, individual persons and organizations are identified as parties. Parties, customers, and banking accounts are separate elements that are linked to each other through institution-defined relationship types. While every account must be related to one or more customers, parties can exist with or without account relationships. Relationships, accounts in other systems, and organizations can be easily linked to customer records and aggregated, providing a comprehensive customer view. This contrasts with most legacy systems, where ‘customers‘ often consist of a few fields embedded within account records.

Similar to customer-to-account relationships, customers can be related with each other through one or more affinity types, such as households or other associations. Based on these groupings, account information can be aggregated in real time at the customer and affinity type level. FIS Profile provides services and user interfaces to define these relationships on a dynamic basis, and also supports bulk uploads from third-party customer information system (CIS) scrubbing services.

The powerful Profile customer-centric data model is utilized throughout the application to calculate relationship profitability; to price products and product packages; to open and service accounts; to calculate risks and limits; and to generate statements, correspondence, and reports.

Integrated Product Factory

A hallmark of the FIS Profile design and the key to its flexibility is its integrated product factory, a built-in ability to assemble products from a collection of components that are the common inventory of all deposit and loan features. The difference between one product and another is determined by the unique configuration of the components (a.k.a. sub-assemblies) of each one.

These components, representing thousands of unique features, are dynamically assembled into product templates through administrative services that are fully accessible to business analysts. Agnostic to traditional product classification (e.g., DDA, CD, line of credit, mortgage, etc.), the assembly process leverages the same inventory of components. Therefore, banks can achieve a significant reduction in time to get new products to market. A documented case study measured one bank’s pre-Profile business process for new product introduction at an average of six months; with Profile, that time was reduced to an average of 20 days representing a 90 percent average reduction in time-to-market.
Case Study Facts

One bank’s pre-Profile business process for new product introduction was measured at an average of 6 months.

With FIS Profile that time was reduced to an average of 20 days.

This represents a 90% average reduction in time-to-market.

Product Factory Menu Options

FIS Profile’s product assembly process provides the maximum amount of product flexibility, because any feature can be used by any product category. Within Profile, a feature is not locked into a vertical product application or pre-determined functional area (a.k.a. stovepipe). As new features, technology, and/or regulatory enhancements are developed and deployed, they become available instantly across all traditional product categories.

While the number of parameters is extensive, it is constantly evolving, incorporating new product features from many countries and lines of business. The fine granularity and sheer scale of the feature set provides an enormous number of combinations and flexibility, to the point that typically 95-98 percent of even the most sophisticated institution’s products and processes can be configured from existing features (without gaps), compared with 80-85 percent as the generally accepted norm.

Since its supply chain is comprised of bits and bytes, Profile can support multiple product tiers, including the ability to build-to-order products at the individual account level. Functionally within this system, every account is its own “instance” of a product. This very powerful market-of-one architecture provides a distinct competitive advantage in the financial services sector, enabling institutions to tailor a product or product package for any individual customer.

Products manufactured on Profile can be automatically published to both consumer and captive servicing channels in real time (including FIS Xpress and TouchPoint), resulting in the immediate distribution and availability of new banking products.
Product Packages and Agreements

In Profile, discrete products and services can be combined to form packages. Product packages enable banks to bundle selected products (e.g., DDA, SAV, LOC, etc.) and services (e.g., Overdraft Protection, Debit Card, Bill Payment and Presentment, E-statements, Alerts, etc.), while still providing the flexibility to tailor specific components to meet the needs of an individual customer agreement.

Accounts and packages in the form of agreements are associated with a customer. Rules can be associated with both products and packages that allow for optimized pricing, thereby enabling automated one-to-one customer pricing based on various attributes of the existing relationship. For example, attributes such as channel use, payment plan, and services utilized can be defined in a rule set that matches pricing to the benefit derived from the relationship.

When a customer selects a package, an agreement is formed that defines the accounts and services that comprise the package along with agreement-specific properties. These agreements are then linked to the customer.
Modular Deposit and Loan Processing

Profile’s rich inventory of product components combine to create deposit and loan accounts to service multiple markets including retail consumers as well as the most sophisticated commercial customers. Accounts of the same product type can behave very differently depending on the options selected at the time of account creation. This drives personalization and customization to a “market-of-one” where appropriate.

Further, Profile can apply rules that allow for account behavior to be based on a set of conditions and results. This allows for a default set of attributes based on the rule sets. For example, interest and service fees can be based on a branch or region or further by customer type.

Deposit accounts have many options that can be associated with a retail consumer or commercial customer. Sweep processing, for example, can be used to provide overdraft sweep capabilities for the retail customer and zero balance and target balance sweep for effective cash management of commercial accounts. Thresholds can be set that govern sweep processing to allow for transfers between accounts based on definitions. Additional key capabilities include:

- Trust Account processing
- Daily accrual calculation with flexible posting options
- Extensive available balance and float assignment options
- Notional pooling of balances for interest calculation and transaction authorization
- Segmented account processing that allows for and tracks multiple deposits during the life of the account
- User-definable penalty processing options
- Investment sweep capabilities including transfers based on unique threshold definitions for purchase and redemption
- Multi-account overdraft sweep options, with automatic repayment option
- Extensive fee processing options including account analysis for commercial customers
- Flexible savings incentive plans
- Account reconciliation
- Positive pay
- Customer- and account-level alerts
- Full retirement account processing and plan processing
- Full passbook processing with support for book and no-book transactions
- Close Account utility

Profile supports a full range of loan products including revolving loans and lines, term accounts, mortgages, and installment loans, as well as business-focused products such as commitments, convertible loans, construction loans, and participations. Some key differentiators of Profile’s loan processing capabilities include:

- Ability to configure payment application capabilities depending on the state of the loan at the time of payment. For example, a payment can be applied differently if the payment is made in advance, on, or after the due date. This flexibility allows for collection of interest and late charges to improve interest and non-interest
income. Collateral management provides for the association of collateral to a customer with a many-to-many relationship between the collateral and the loan accounts which the collateral secures.

- Delinquency parameters that support non-accrual processing as well as loan reclassification and provision processing completely configurable by the institution.
- Full support for escrow processing, sundry, and remittance.
- Commitment processing with support for a master commitment and hierarchical sub-commitment levels across currencies.
- Loan renewal processing.
- Multiple payment component calendars.
- Automatic charge-off / recovery
- Alert and event notifications
- Logical multi-site (LMS)

**Debit/ATM Card Issuance and Transaction Processing**

FIS Profile (V7.4.2 and higher) provides an “end-to-end” Debit/ATM card processing solution. Capabilities include configuration, definition of multiple card types and statuses, linkage of multiple cards, standard and custom card number generation, associating multiple accounts to one card, linkage of additional card members to one card, card issuance, transaction processing, card notes, card renewal processing, restrictions, back-office capabilities, and reporting tools.

Note that earlier versions of FIS Profile provide card management capabilities, but the processing of the ATM and debit card transactions was performed through a card interface. With the V7.4.2 enhancements, financial institutions can use FIS EFT-Milwaukee (EFT-MKE) for debit/ATM card issuance and transaction processing as part of the end-to-end FIS Profile solution.

Further, FIS Profile V7.5.4 includes multiple Cardbase integration enhancements. The Cardbase Card Management system runs alongside the switch that authorizes ATM/POS transactions and routes them through FIS and its shared networks. Its primary purpose is to record and track information about transactions conducted with plastic debit and combination cards at automated teller machines (ATMs), point-of-sale (POS) terminals, and merchant locations throughout the world, and to pass that information to other applications (such as FIS Profile) for posting to appropriate accounts. Cardbase and Profile securely record and store nonpublic personal information about the cardholders who own and use the plastic cards.

Financial institutions can identify a card status as a ‘Warm Card’ or a ‘Compromised Card’. The most up-to-date card status, reason code, and expiration date for the cards reside on the Cardbase database and are updated in a timely manner on the Profile database.

Cardbase integration enhancements include updates to:

- Name, address and phone maintenance for cards
- Card status and expiration date
- Multiple system of record (SOR) capability for card status, reason codes and expiration dates
- Compromised cards
- Replacement cards
When a customer’s mailing address is updated in Profile, the system retrieves the list of cards linked to the customer. Profile then sends the needed information to Cardbase to update the card mailing address for all linked cards.

Because FIS Profile is SOA-enabled, it supports integration with other debit card management systems as well.

**Compliance and Regulatory Reporting**

FIS Profile provides compliance to United States regulatory mandates. Some of the key areas supported include:

- Regulation C: Home Mortgage Disclosure Act
- Regulation CC: Availability of Funds and Collection of Checks
- Regulation D: Reserve Requirements of Depository Institutions
- Regulation DD: Truth in Savings Act
- Regulation E: Electronic Fund Transfer Act
- Regulation O: Loans to Executive Officers, Directors, and Principal Shareholders
- Regulation P: Privacy of Consumer Financial Information
- Regulation X: Real Estate Settlement Procedures Act (RESPA)
- Regulation Z: Truth in Lending
- Fair and Accurate Credit Transaction Act (FACT Act)
- Homeowners Protection Act (HOPA)
- Non-Public Information (NPI) Compliance
- Payment Card Industry (PCI) Data Security Standards (DSS) Compliance
- Servicemembers Civil Relief Act (SCRA)
- USA Patriot Act sections 314A and 326

Profile provides standard Internal Revenue Service (IRS) reporting, updated annually as appropriate. Other areas of compliance support include Basel II and some non-U.S. localization requirements.

In addition to supporting mandates already enacted, FIS continually monitors and makes the necessary changes to support and comply with new mandates issued by U.S. regulatory bodies and participates in annual FFIEC audits.

FIS publishes a set of **FIS Profile U.S. Regulatory Compliance** documents which provide evidence regarding how FIS Profile meets United States (U.S.) banking regulations. This information is available to our clients via secured websites such as the FIS Client Portal and FIS Profile User Documentation Set wiki (and may be provided to prospects upon request).

**Massive Scalability**

FIS Profile is a highly scalable system, tested and proven in production and in benchmark testing environments. The size of the production databases running Profile range from de-novo banks to a current production client with 40 million accounts contained in a single integrated database.
In a benchmark environment, Profile was certified against 100 million accounts and more than 25 billion customer history records; the results were measured at greater than 3,000 online transactions per second (TPS) with an average response time of less than 1/10th of a second.

Scalability measures go beyond transaction throughput metrics: Financial institutions require great operational integrity and automation. FIS Profile supports these requirements as follows:

- **Intrusion protection security.** Banks and financial institutions are primary targets for fraud, hacking, and denial-of-service attacks. They require thoroughly vetted technology and defensive architecture to thwart intrusion attempts. The Profile core and channel applications have an excellent record against this type of risk (without exception, across the entire customer base).

- **Database access and security.** Profile has an extensive set of authorization and privilege protocols, including database table privileges with run-time query capabilities. This set of protocols exceeds the capabilities of alternative solutions in the market and, along with the extensive audit and alert systems, provides industry-leading security.

- **Transactional access and authorization.** Profile supports multi-factor and tiered authorization protocols, as well as real-time 24/7 transaction authorization. The system has an industry-exclusive customer-driven authorization firewall that can be configured in real time to accept or block any transaction based on transaction-specific, institution-defined properties.

- **System availability.** Profile operates in a 24/7, continuous-update-availability mode. Within a Profile banking operation, the real-time authorization system (supporting all channels) and the System of Record (SOR) are one and the same. This provides the highest level of customer service and eliminates any potential conflict, inconsistency, or reconciliation across systems (something common to all batch solutions as well as online solutions that require offline processing). Additionally, there are no periodic scheduled process dependencies that require the system to be shut down and restarted once it is in operation.

- **System ability.** Profile is an extremely stable application that relies on redundant server instances to ensure continuous uptime availability, even in the event of an application error. Exclusive in the industry, Profile also implements real-time Logical Multi-Site architecture to ensure online availability even during scheduled upgrades to the infrastructure, operating system, or application. One real-world FIS customer has achieved nearly five years of continuous uptime and many have exceeded a one year mean time between outages.

- **Configuration governance and change management.** Profile implements a very sophisticated change management process that encompasses source code, schema, configuration parameters, and operational tables (e.g., bank products and rates). All elements are formally extracted from staging environments and moved into production environments within packages that can be evaluated relative to the target environment, installed, and – if necessary – also removed.

- **Real-time business continuity.** Profile replicates changes to the database state to multiple remote locations in real time, ensuring that a failover event can immediately re-direct the system of record to a local or remote backup location that contains the most recent, up-to-date database state. Production failover in a Profile environment is a near-real-time event, which is a significant improvement in business continuity over alternative platforms.

- **Management information systems (MIS), ad hoc, and business intelligence (BI) reporting capacity.** By replicating multiple copies of the database across independent nodes through logical multi-site replication, Profile can target individual nodes for reporting and other IT functions without impacting the system's capacity or throughput with regard to online transaction processing. Reporting and analytic overhead (for example, real-time fraud detection and executive and operational dashboard reports) can be isolated on nodes that are designated specifically for those purposes.

- **Real-time financial balancing.** Profile ensures that every transaction is in balance at the time it is committed, ensuring that the system as a whole is always in balance. Suspense accounts can also be monitored in real time, and/or tied to event processing, ensuring the immediate recognition and resolution of targeted exception conditions.
• **Built for today's banking realities.** Globalization and around-the-clock customer self-service channels have changed the way banks must do business. Banks realize their "batch windows" have become obstacles, underscoring the need to eliminate batch-based day-end processing. The FIS Profile solution offers a compelling alternative to help secure the real-time advantage that is essential for today's market realities.

## Multi-platform Support

FIS Profile is operating in production environments around the world on the following platforms:

- IBM AIX P-series
- Intel Red Hat Linux

The choice of platforms provides financial services companies with flexibility and leverage in determining their operating environments. Some organizations choose to mix and match platforms, for example, using one platform for their production environment, and another for real-time reporting images, development, and testing.

With Profile, the identical application source code exists across the supported platforms, maximizing portability and ensuring that the same release level is available to all customers and markets. Source code can be copied and simply recompiled, with no changes, across platforms.

## Multi-channel Architecture

Profile is a "channel-agnostic system"; that is, the internal transaction processing logic (including transaction authorization, account updates, balancing, and general ledger settlement) is common across the application, regardless of the source of the transaction, interface type, or product classification.

All transactions are authorized, posted, and settled to the general ledger through an identical process, whether they arrive from the branch or teller channel, ATMs, the internet, or a batch source such as check inclearings, ACH, or automatic pre-authorized payments. This dramatically simplifies the setup of the system across clearing sources or channels, and ensures consistent balancing, settlement, and reporting.

Profile’s channel-independent architecture simplifies the addition and support of channels by automatically inheriting the framework’s existing authorization, update, balancing, and settlement process. This architecture is intrinsically designed to process transactions from multiple channels concurrently, including concurrent batch and online processing.

FIS Profile features native support of service oriented architecture (SOA), based on the industry-standard IFX message set, making Profile the world’s most open core banking platform. FIS Profile is clearly positioned as a banking utility for the next generation of SOA-based operations.
Service Oriented Architecture

Profile is an SOA-enabled application that makes all of its content available through standards-based services. As such, customer and account data is exposed to participating channel applications or to an existing SOA gateway. FIS is an industry leader in SOA for the banking industry based on the vast catalog of content available out of the box as business services. The existing industry-standard services library for Profile implements a rich inventory of banking functionality that allows any channel application (including online banking, mobile, call center, sales and servicing, and teller) to plug into the enterprise through a common set of business services.

For example, one feature of the alerts service that institutions can provide their customers is the ability to communicate alert messages through the Profile WebClient online banking application and the Profile WebCSR banking application, as well as to deliver the alert messages to the customer through a communication method defined by the customer. For example, customers can use email, Secure Messaging, or Short Message Service (SMS) on their mobile phone devices to be informed of recurring events such as statement availability, payment due notices, and balance threshold events.

The services tier of Profile is Java EE based, and the service content is based on the Interactive Financial eXchange (IFX) standard. Industry standards are employed for message-binding frameworks including Simple Object Access Protocol (SOAP) and Web Services Definition Language (WSDL). Further, the services tier uses standard application servers including WebSphere, WebLogic or JBoss.
API Gateway, Management and Analytics

Big Data, Cloud Computing, Mobility, Social Media and APIs are changing the landscape of what is possible with technology. A dominant trend in Financial Services is to bring ubiquitous connectivity with open architecture and user-centered design that is transformational for the business, while ensuring uncompromised privacy and security.

The FIS API Gateway provides the centralized integration point for channels to connect to FIS systems. The API portal enables simplified user provisioning for developers and solution architects responsible for bringing software solutions to market. Registration of these application end-points on the portal enables analytics to be collected and viewed to help improve the effectiveness of the integration points.

FIS API Management capabilities enable the financial institutions to keep pace with the new digital economy. The rapid pace of the market demands a high level of agility and the need to give the development community the integration tools and patterns they have come to expect. The FIS API developer portal simplifies the onboarding process for developers to discover applicable APIs, and to use them once authorized. The API Gateway provides the tools necessary to support the transition to RESTful APIs and security models such as OAuth 2 and OpenID Connect, in addition to other traditional integration interfaces such as SOAP and XML over HTTP.
Benefits and opportunities for institutions using the FIS API capabilities include:

- Market expansion
- Shortened onboarding time
- Simplified developer access to / discovery of APIs
- One centralized portal that can be used across FIS products
- Standardized integration across enterprise solutions
- Increased innovation and speed to market
- Facilitates public access when appropriate
- Supports leading integration patterns including RESTful services, OAuth 2, and OpenID Connect
- Cloud architecture enables deployment models to meet security and scaling requirements
- Flexible billing plans
API Gateway

The API Gateway is the runtime engine that processes online traffic via a proxy designed to efficiently process rules described in the format of policies. Proxy templates enable consistent application of security policies and optionally other API policies, perhaps in the form of light transformation. The primary goal of the API Gateway is to provide a common interface point from external channels to back-end hosted components.

API Management

API Management supports the API lifecycle. This includes:

- Design
- Development
- Security
- Publishing
- Scalability
- Monitoring
- Analysis
- Monetization

**Design**
- Design first. Document Smart
- Full support for Swagger 2.0
- Developer engagement & design feedback

**Monetize**
- Flexible rate plans
- Internationalization support
- Usage tracking
- Limits and notifications

**Analyse**
- Complete visibility— from app-end to backend
- Automatically and continuously collect all API traffic data out of the box

**Secure**
- End-to-end security
- Threat protection
- Access control
- Simple OAuth implementation for your APIs
- PCI and HIPAA compliance
- P3P2, GDPR, Open Access to Account

**Monitor**
- Centralized control, decentralized development
- Multi-tenant architecture
- Billions of API calls, including large spikes

**Publish**
- Turnkey developer portal

**Scale**
- Self-service
- State @ scale
- Flexible deployment

**Develop**
- Configuration: Over 30 ready-to-use & configurable policies
- Code: Built-in support for Node, JavaScript and Java
- extensibility BaaS

**FIS Profile Core Banking Solution**

**API Consumers / Developers**

**API Providers**
API Analytics

The FIS API Management platform supports analytics directly to the application owner in the developer portal. The platform also supports various forms of analytics to identify your top developers, the devices most commonly accessing the APIs, and the nature of traffic flow in any given hour, day, and month.

Profile Web Services

Profile Web Services are Representational State Transfer (REST) services. Developed in a REST architectural style, the Profile Web Services form a middleware that facilitates an efficient exchange of data. REST provides a lightweight alternative to mechanisms such as Remote Procedure Calls (RPCs) and Web Services (e.g., SOAP, WSDL). The REST architecture provides a set of architectural constraints applied to components, connectors, and data elements. By ignoring the details of component implementation and protocol syntax, the Profile Web Service APIs provide many benefits.

Profile Web Services support the following functional areas:

- Account list
- Account transaction list
- Alert messages
- Bill pay enrollment
- Dashboard
- Deposit accounts list
- Deposit calculator
- External accounts
- Funds transfer
- Investment sweep
- Investment sweep summary
- Loan accounts widget
- Loan calculator
- Messages
- Overdraft protection
- Pending overdraft window
- Product
- Product services
- Savings incentive
- Service management
- Stop manager
- Transactions widget
**Float, Funds Availability and Posting Priority**

As a real-time system, Profile completes a transaction at the moment it is received and updates the customer accounts accordingly, though items can be bulk processed from files in batch mode. If applicable for a transaction, Check holds, Float holds, Proof-of-Deposit (POD) holds, and Debit authorization holds are also assigned at that time. The determination of hold expirations is institutionally defined and complies with U.S. and international regulatory requirements.

Profile also offers a highly flexible set of options to calculate funds availability, including whether to base this amount on the ledger or collected balance, and whether to include check holds, overdraft limits, sweep accounts, and investment accounts. Additionally, the formula used to calculate the available balance can be determined at the individual product or account level.

To facilitate the integration between real-time and batch transaction sources, Profile can receive and process batch transactions at any time during the processing day, concurrent with on-line transactions. FIS Profile offers a unique ability to temporarily suspend rejected batch items and to re-apply batch transactions at the logical end-of-day according to institution-based or account based priorities.

**Flexible Processing Schedules**

FIS Profile processes are never tied to specific frequencies (such as monthly interest posting) but can operate on any cycle or frequency. Any frequency in the system (such as interest compounding and posting or statement generation) is established with the individual account and/or the customer record itself.

Given this design, products such as biweekly mortgages are immediately available in Profile, because there is no processing tied specifically to a monthly cycle. In fact, the only processes involved are a date-change event, which advances the General Ledger transaction journal date and kicks off day-end processes, and a year-end reset, which freezes tax and regulatory cutoff information.

In conjunction with this design, Profile supports a wide array of standard cyclical frequencies with a very flexible syntax, as well as unlimited user-defined business calendars and user-defined frequency date schedules.

**Continuous Processing**

FIS Profile is online and available for transaction processing (financial, account opening, servicing) on a continuous 24/7 basis. There is never a batch update cycle in which the system of record is in a different transactional state from the authorization system. Within Profile, authorization and posting always reference the same data and transactions are authorized and posted against the actual system of record. This feature, along with the channel-independent design, is one of the main reasons Profile is the most popular core system for the direct bank market.

**Real-time Business Continuity**

In addition to taking full advantage of high availability hardware, operating system, and application software, FIS Profile implements an LMS architecture that maintains multiple simultaneous copies of the database in geographically dispersed locations. The system can switch to a remote site almost instantly, recovering at the point of the last database transaction. Up to 16 discrete backup systems can be designated for any production node, and each of these can have 16 more backups.

In addition to industry-leading business continuity, LMS supports mixed configurations, including remote machines on different hardware platforms, different operating systems, and even different versions of the Profile.
application. This architecture uniquely enables FIS Profile to provide continuous configuration availability, even in the event of scheduled maintenance or an operating system or application upgrade.

**LMS Reference Implementation**

The Profile/GT.M application stack provides 24/7 availability of all consumer banking functions in live production environments using the logical multi-site (LMS) replication feature. Enhancements to LMS functionality in FIS Profile V7.5.3 provide reliable and near instantaneous failover of the primary instance to a secondary instance.

LMS replication dictates that all transactions posted on a primary server instance are replicated on one or more secondary server instances. When the primary server instance fails, processing is redirected to one of the secondary servers, which then assumes the role of the new primary server.

At the time of the failure of the primary server, there may be one or more transactions that were posted on a primary server instance that were not yet replicated on the secondary server. After journal files of the failed server become available, operational scripts are used to log all non-replicated transactions in a Non-replicated Transactions journal file. All transactions listed in the Non-replicated Transactions journal must be reviewed and applied as appropriate on the new primary server. Some of these transactions can be posted automatically while some will require manual review and consequently manual posting.

Efficiency and robustness of the non-replicated transaction processing play a large role in determining the amount of manual work involved in supporting the failover process. Enhancements released in V7.5.3 support critical requirements such as the recovery of Profile Java Interface (PJI) transactions and Non-standard Message (NSM) transactions. With these enhancements, Profile’s Non-Replicated Transaction Recovery module became more robust; it automatically handles more non-replicated transaction scenarios, and reporting is enhanced to ensure that all non-replicated transactions are clearly reported along with the status of the transactions.

**Real-time Reporting and Analytics**

By implementing a high-performance relational database, Profile supports MIS reporting, ad hoc queries, and real-time reporting and Business Intelligence (BI) analytics. These functions can be executed directly against the production system or from any of the real-time replicated copies. Many institutions implement replicated nodes specifically for the purpose of supporting real-time reporting and analytics, without impacting the performance or capacity of the production system. This is a unique feature in the industry and provides timely reporting and business analytics, while preserving the performance and scalability of the online transaction platform.

In addition to the real-time BI and ad hoc reporting capability, Profile produces the predefined MIS reports that are required to manage a banking IT environment. The system is delivered with hundreds of predefined balancing, reconciliation, operational, administrative, and analytic reports, along with the templates that can be further customized as needed. In addition, through its industry standard database interfaces, the system can be easily accessed through 3rd party reporting and BI tools.

**FIS Integrated Solution**

FIS provides complementary offerings that enable the delivery of a set of integrated banking components. Where appropriate, the integration of these components is based on IFX services for real-time orchestration and straight-through-processing. The Profile solution provides the following integrated solution set:

- Decision solutions including QualiFile and identity verification for OFAC checking
- FIS Card Processing for debit card transaction processing and card management
• FIS Card Production for card creation and distribution
• FIS Bill Payment Solutions supporting bill payment and bill presentment
• FIS Item Processing and lockbox solutions
• Intervoice IVR solution
• FIS Output Solutions including e-statements, paper statements, fulfillment, notices, and correspondence
• FIS Scorecard solution that supports credit and debit card loyalty programs
• FIS Mobile Banking
• FIS Xpress for Remote Data Capture

Through this integrated solution set, FIS can provide a full banking complement or selected components to round out an existing solution set.

**Integrated Third-party Solutions**

In addition to the FIS integrated solution suite, Profile is integrated to a wide array of best-in-breed solutions that enable us to supplement the FIS solution while continuing to focus on our core competency. These solutions cover the following areas:

• Bank secrecy and anti-money laundering management
• OFAC screening
• Bill payment and presentment
• ATM/debit card services
• Check/deposit slip processing
• Multifactor authentication
• Workflow solutions
• Web and digital content management
Flexible Delivery/Deployment Models

The Profile delivery/deployment models can be tailored to accommodate the needs of any bank. Delivery options can range from a licensed model run by the bank “in house” to a “one stop” outsourcing model provided by the highly skilled and experienced FIS team. Banks also have the option to work with FIS in a hybrid approach at all points in between including options such as staff augmentation and application management.

A sample of outsourcing solutions/services include:

- End-to-end solution provider and integrator
- Outsourced bank back-office operations
- Application support and hosting
- Data center operations
- System operations
- Third-party vendor management
- Regulatory/audit compliance
- Technical support
- Application support
- Database administration
- Quality assurance

While Profile’s high level of configurability allows it to define an institution’s full breadth of products and processing options, it is typically provided as a pre-configured application. This option is defined by market and customer type and provides the base set of deposit and loan products, interfaces, standard reports, and processing options in order to facilitate the initial implementation process.
Implementation Services

FIS has successfully delivered banking solutions to our clients for over 40 years. With extensive experience managing large scale implementation projects, the FIS team has a breadth of experience in all areas of banking as well as technical expertise in core banking applications; channel applications across all customer touch points including online banking, call center, branch, mobile and interactive voice response; and data and application integration. We provide and support an onshore/offshore staffing model providing the needed scale to effectively implement and manage a wide range of projects.

Whether taking an application from mere concept to production, enhancing the functionality of an existing system, or integrating business-critical data from multiple systems, FIS has the experience and technical expertise to successfully deliver.

Skills span the full range of application development and systems integration challenges. We have the breadth and depth of experience to satisfy a client’s professional services needs for complete application development, modifications or enhancements to existing applications, and integration of disparate systems using the most cost-effective solution.

The FIS professional services organization provides knowledgeable people to support the comprehensive array of the company’s leading-edge software products, as well as products from other providers and clients’ custom applications. These solution architects, technical analysts, developers (mainframe and client/server), business analysts, and project managers are equipped with the know-how, insight, and vision to think through, develop, and execute strategic business solutions as well as manage day-to-day, tactical business imperatives.

Secure by Design

FIS Profile is secure by design, with multiple layers and facets of security built into the solution and its deployment. Each GA release builds upon the security features to keep pace with technology today.

Profile user limits and privileges

Areas of the system are restricted to certain groups of authorized users (user classes), as defined by the institution during implementation. Within each user class, Profile’s security features limit an individual’s access. The system authenticates a user’s privileges quickly and easily.

Online and batch users are the individuals and processing entities at the institution that have access to Profile. The institution creates an individual user ID for each person or entity that needs system access. Each person or entity must specify the required user code and encrypted password to access the system. Profile’s sophisticated password hashing and storage mechanism thwarts hacking attempts; helps ensure that sensitive data is not compromised; and prevents unauthorized financial transactions.

The institution can specify processing limits and privileges per user. For example:

- Establish batch processing controls for retry processing.
- Assign users to a specific branch code to access accounts for only that branch.
- Establish cash maximum controls for a teller to ensure cash management.
- Assign general ledger (G/L) numbers for user activity (e.g., over/short G/L for tellers and transaction suspense).
- Enable a user to post transactions in a single-currency environment or a multi-currency environment.
• Give users restriction override authorization (e.g., the head teller at a bank may be given override authorization for restrictions that apply to transaction processing).

• Establish login controls, such as assigning a user ID and password, establishing and enforcing a password policy, expiring passwords on a regular basis, and forcing users to change their passwords upon password expiration.

• Authorize who may process transactions today with a teller balancing date in the future (i.e., PMing).

• Limit the number of days into the past or future when a user can post transactions.

• Control user access by function.

• Identify accounts that the user may not access for financial transactions.

• Limit the maximum debit and credit amounts that tellers may post.

• Enable overdraft protection for transactions posted by batch tellers.

• Configure return item processing for rejected batches.

• Assign users to a user class, which links a set of characteristics with a group of system users.

• Restrict or enable a user to assign, change, or remove permissions on a user class to which they are assigned.

• Separate groups of customers and their accounts from the rest of the institution’s account base for servicing.

• Assign users to a user class that is designated to run authorized functions on a report server instance.

• Restrict permissions updates to occur only during specific time periods (e.g., during normal business hours only) and/or indicate the specific computers that may be used to update the permissions (by IP address).

**Passwords**

Profile’s password controls and configuration options include:

• Strong passwords (combination of letters, numbers, special characters, and minimum length requirements)

• Minimum password history / reuse

• Minimum password age

• Password expiration warning (days in advance)

• Password expiration (initial setup and after reset)

• Maximum allowable password attempts

• Password revocation

• Systematic notification of password change

• Choice of hashing methods (for password encoding and storage)

• Password storage formats

• Migration of password storage format

Host and branch authentication is based on user ID, password, branch code, and password expiration date. When a password expires, the user must enter the new password and a confirmation password to reactivate the password.
WebClient user authentication

WebClient user authentication enables institutions and users to authenticate customer login with challenge questions that are used as an additional security layer and meet the Federal Financial Institutions Examination Council (FFIEC) Agencies’ guidance on using effective methods to authenticate the identity of customers. Profile provides this capability as part of its layered online security system by identifying the customer’s computer hardware as a second factor of authentication and because it authenticates the customer to the site and the site to the customer. The RSA security application manages this authentication process.

Data masking

Profile can mask customer or account data values when the data displays on the user interface. Financial institutions can configure how the information is masked. For example, the financial institution can set masking details for a specific field per channel and user class. The mask definition indicates the number of digits or characters in a value that are masked versus visible. The definition also indicates the character that is used to mask the digits.

Examples of information that the institution might mask include:

- Tax ID number
- Card number
- Account number
- IBAN
- Driver’s license number
- Passport number
- Other identification number
- Inter-bank funds transfer account number

Data for the specified field is masked on every page where it appears in the specified channel, if accessed by a user in the user class indicated.

TIN truncation on IRS forms

Profile institutions can specify that taxpayer identification numbers (TIN) are truncated in the extracts used to generate physical Internal Revenue Service (IRS) forms.

WebClient browser support

Profile WebClient provides a consistent user experience regardless of the type of browser or version the customer uses to access the online banking website. For example, a customer may access his or her bank accounts online using a personal computer, tablet, and/or smartphone. This could involve using the Internet Explorer® browser on the personal computer and the Opera™ and Safari® browsers on the smartphone and tablet. This diversity is transparent to the customer: The features and user experience offered by your internet banking site remain consistent across the multiple browsers.

To safeguard customers and your institution, institutions can identify certain browsers as being risky (for example, due to a propensity for malicious attacks) and then can disallow or block those browsers from being used to access the institution’s internet banking offering. Authorized personnel at the institution define the list of
unsupported (blocked) browsers and unsupported browser versions. Profile security identifies whether a browser is supported or blocked, and if it is compatible with the internet banking offering (and displays an informational message to the user if the current browser cannot be used).

**Suspected activity**

If any suspected activity is detected, users are automatically logged out of Profile, and a “Suspected Activity” error message is displayed and logged.

**Account verification and applicant validation**

Profile utilizes the FIS Discovery Platform Account Verification Web Services (Decision Solutions) to validate information about applicants during the account opening process. Applicant validation options may include ID Verification, ID Authentication, QualiFile credit check reports, Office of Foreign Assets Control (OFAC) reporting, ChexSystems® validation, external account ownership validation, and risk management.

**Misconceptions and Myths**

Now let us address some misconceptions and myths in the marketplace. The items below are often identified as issues related to real-time systems, and more specifically the Profile application and how it operates within a traditional branch bank environment. Some of these issues are simple misconceptions, while others have been elevated to the status of “urban legend”. The information which follows addresses the underlying concerns with a factual presentation of the FIS Profile solution.

Topics include:

- Authorization
- Scale/performance
- System of record updating
- Funds availability, holds and float
- Priority of payments
- Front-office versus back-office workflow
- Commercial deposits
- Interaction between batch and online Processing
- System and G/L balancing
- Branch banking
- Loan functionality
- U.S. regulatory compliance

**Authorization**

**Myth:**

*Memo post systems and daylight authorization front ends provide the same authorization functionality as a real-time system.*
**Fact:** A real-time system authorizes all transactions against a single, common system of record (SOR). As transactions are authorized and posted, the system of record immediately updates the account, which is used for any subsequent authorization. Transactions from batch inputs (e.g., item in-clearing) are processed identically to transactions from on-line channels. Profile contains sophisticated serialization and concurrency control mechanisms to ensure database consistency.

Given this capability, the Profile SOR database ALWAYS represents the latest, completed state of activity. There is no requirement for an end-of-day posting function to complete the update of the SOR. Additionally, this design applies to all updates, not just financial transactions (for example, account boarding, servicing, fulfillment, file maintenance, system administration).

The main benefits that accrue from this design over memo post or authorization front-ends are:

- No reconciliation or synchronization required between the authorization system and SOR; no potential for drift between authorization records and SOR records
- Global view of SOR data across all channels; no potential for different states across different channels
- No day-end transaction update critical-path window; this enables true 24/7 architecture
- All edits and exceptions are 'in scope' which eliminates most exception processes and substantially reduces Day 2 exception handling
- Less operational complexity and physical infrastructure requirements

**Scale / Performance**

**Myth:**

Real-time systems can’t scale to the same account volume as batch systems.

**Fact:** Profile has exceeded 3,000 on-line transactions per second, with an average response time of less than 1/10th of a second at that volume, on databases up to 100 million accounts. This is well in excess of the capacity of the existing legacy systems and any published competitive commercial alternative. This throughput level should support the most demanding requirements of all existing financial institutions (and can be even further scaled if ever necessary).

Additionally, the elimination of a ‘critical path’ day-end transaction update further extends the scalability of the system, since the transactional updates are smoothed over the processing day.

**System of Record Updating**

**Myth:**

There is still a day-end update process on Profile; therefore, it is no different than a batch system.

**Fact:** Profile posts transactions as they are received in real time, as a straight-through-process (STP). All necessary tables are updated appropriately, including the customer’s account(s), the transaction history, and the daily transaction journal. There is an end-of day process to update an external G/L from the daily transaction journal, but that is not in any processing ‘critical path’ and does not affect the availability of the SOR across any channel. There are also end-of-day processes at the account level (e.g., to calculate a daily accrual), but Profile supports real-time 24/7 availability throughout these processes.
Funds Availability, Holds and Float

**Myth:**

Real time = immediate funds availability.
Banks lose float compared to batch systems.

**Fact:** Profile carries multiple balances on an account, including the ledger balance, collected balance (funds available to the institution), and available balance (funds available to the customer). When transactions are posted, the ledger balance is immediately updated by the principal amount of the transaction. The collected and available balances are updated by the portion of the transaction amount that was defined to clear immediately by regulatory and institutional rules (that is, cash). If appropriate, float records are also generated in real time, which identify which amounts to clear to collected and available balances and the clearing date(s).

The float records can be stipulated from the source of the transaction or automatically generated from the R&T number of a deposited item. They can also be manually entered or overridden (as required) with transactions defined for those purposes.

The formula to determine funds availability can be institutionally defined, and further customized at the product and individual account level. Additionally, the determination of the balance on which to base daily interest accrual processing can be defined at the institution, product, and account level.

Net, there is NO DIFFERENCE between the availability and float between Profile and a batch system, unless an institution explicitly defines it through configuration parameters.

Priority of Payments

**Myth:**

In an on-line system the ONLY possible order of transactions is purely chronological.

**Fact:** In Profile, transactions within a batch posting file (e.g., inclearing) are sorted according to institutionally defined criteria (e.g., check number, high-to-low, low-to-high, PICO); these criteria can be established at the institution, product, or account level. If an account is in an overdraft state, the payment prioritization of transactions is evaluated across all batches within a processing day as part of a scheduled end-of-day processing event. This will allow multiple batches, from multiple sources, to be posted throughout the day, but for the payment priority and return item decisioning to be governed across all the batches.

On-line transactions are authorized and posted in real time, as they are received. Banks can opt whether to include the impact of batch transactions posted earlier that day in the consideration of the on-line available balance.

Front-Office versus Back-Office Work Flow

**Myth:**

On-line systems shift work from the back-office to the front-office.

**Fact:** Profile provides maximum flexibility as to the operational practices of an institution. Given the straight-through-processing nature of Profile, most updates and workflows can be completely captured and resolved at the
point of sale or capture (e.g., account opening, fulfillment, and maintenance), actually reducing or completely eliminating workflow and exception handling.

**Commercial Deposits**

**Myth:**

*Profile doesn’t support commercial deposits.*

**Fact:** Profile can process the individual check items at the point of sale (whether remote capture or teller line), or it can batch (branch) settle the items using a ‘checks received’ transaction code. This transaction code debits the POD suspense G/L, which is subsequently cleared through a batch POD inclearing interface. Banks can decide specifically how to handle individual use case scenarios, based on item volume, staff allocations, and funds availability determination. There is no requirement to process individual items at the point of sale; conversely there is no restriction either.

**Interaction between Batch and On-Line Processing**

**Myth:**

*An on-line system cannot process batch files and you cannot mix batch and on-line transactions.*

**Fact:** Most banks, even on-line banks, receive many batch interfaces that include financial transactions, fulfillment transactions, or other maintenance transactions. Profile can process batch transactions at any time, as determined by operational schedules and priorities. Batches can be posted concurrently with other batches, and concurrently with on-line transactions and events. There is NO separate on-line and batch window in Profile, as it is ALWAYS on-line.

**System and G/L Balancing**

**Myth:**

*An on-line, real-time system is difficult to balance, because there is never a balancing cutoff.*

**Fact:** Every transaction posted in Profile is always two-sided, and always in balance. A bank can produce a real-time balance sheet at any time during the day, and it would always represent the current G/L totals and always be in balance (debits = credits).

For accounting and institutional G/L and reporting purposes, Profile contains a date-change event. This event simply changes the system accounting date from the current date to the next system accounting date. This date is a primary key to the Daily Transaction Journal table, and effectively allows the accounting date to change, in real time, in an instant. Since the transaction journal is date-keyed, there are no additional closing or initialization steps required and subsequent transactions are instantly processed on the next accounting date. Profile contains complete effective dating, both forward dating and back dating, to ensure that the account impact of a transaction (e.g. accrued interest) is dealt with appropriately and independently from the institutional accounting date.

**Branch Banking**

**Myth:**

*Profile is a ‘Direct Bank’ system and not designed to support branch banks.*
Fact: Profile is a multi-channel system that supports branch banks of very significant scale, across 25 countries, including the U.S. In all there are over 12,000 retail branches and 30,000 ATMs currently connected to Profile across the world. Some banks have branch networks exceeding 1,000 branches.

Ultimately, there is nothing within the Profile architecture that either prohibits or emphasizes any delivery channel, especially branches. In fact, Profile contains completely integrated branch and teller servicing applications as well as being completely integrated to the TouchPoint branch and teller applications, and providing industry standard IFX services to integrate to any 3rd party channel application.

We anticipate that FIS Profile will continue to gain a larger “branch presence” as banks in the U.S. and throughout the global market migrate from legacy core systems to modern solutions.
Loan Functionality

**Myth:**
Profile does not have proven loan functionality.

**Fact:** Profile has very robust loan processing capabilities, across a variety of lending product lines with a blue-chip customer base. Production clients have used Profile to process Lines of Credit (LOC), Margin Lending, Business Lending, Mortgages, Installment Loans, Installment Credit, Hire Purchase Lending, and Leasing. There are well over 100 global institutions that utilize the Profile Lending package, typically as the sole integrated lending system institution-wide.

Specific commercial loan attributes include:

- Ability to process multiple rate indexes (floating, LIBOR, FFO, Prime)
- Fixed, Adjustable, and Promotional Interest Rate Calculations
- Flexible Repayment Terms (Principal only, Interest only, P&I, Interest with Principal Reductions, Demand)
- Flexible Collateral Code and Cross Tracking Capabilities
- Multiple Commitments

U.S. Regulatory Compliance

**Myth:**
Profile is not U.S. regulatory compliant.

**Fact:** Profile complies with all U.S. federal regulations according to the most current FIS interpretation, and is maintained to current compliance standards. Profile also complies with many international regulations and standards (e.g., BASEL II).

In some cases, Profile provides market leading capabilities when implementing compliance, such as in the customer and account origination process, which are completely automated in real time and meet all compliance requirements.

Further Information

For more information, please visit [www.fisglobal.com](http://www.fisglobal.com).