



Anatomy of a FinTech Technology Stack

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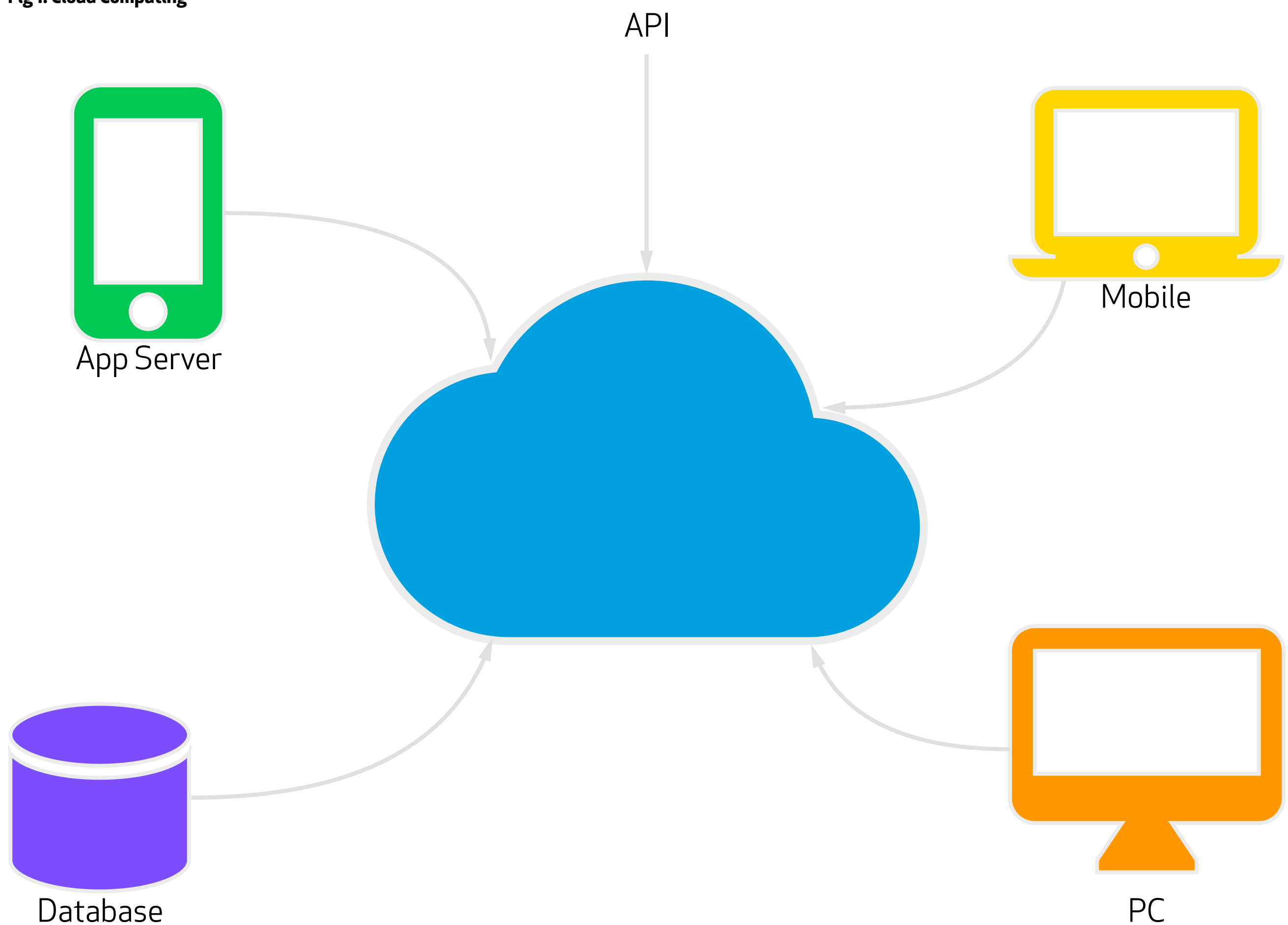
Executive Summary

We examined some of the new technologies that are causing waves in the FinTech space. Choosing the correct technology stack for your FinTech is vital. Typically we work with customers getting to Minimum Viable Product (MVP) as cost effectively as possible however FinTech companies face a tougher challenge. Sensitive data, ever increasing regulatory and Anti Money Laundering (AML) requirements, and EU's looming Payments Services Directive mean that FinTech companies need to construct a tech stack that is secured, agile, scalable, and easily integrates with third parties. We see some common issues arising which we examined and explored below.

FinTech companies are continuing to attract investor funding and with that whole FinTech startup ecosystems have sprung up involving banks, accelerators, government agencies and developers. While there is a huge growth in support players - software underpinning these Fintech challengers varies hugely.

If you are considering what your FinTech tech stack should look like and whether you should use Banking as a Service, Platform as a Service or Blockchain as Service or indeed a hybrid - we will share some of our insights below.

Fig 1. Cloud Computing



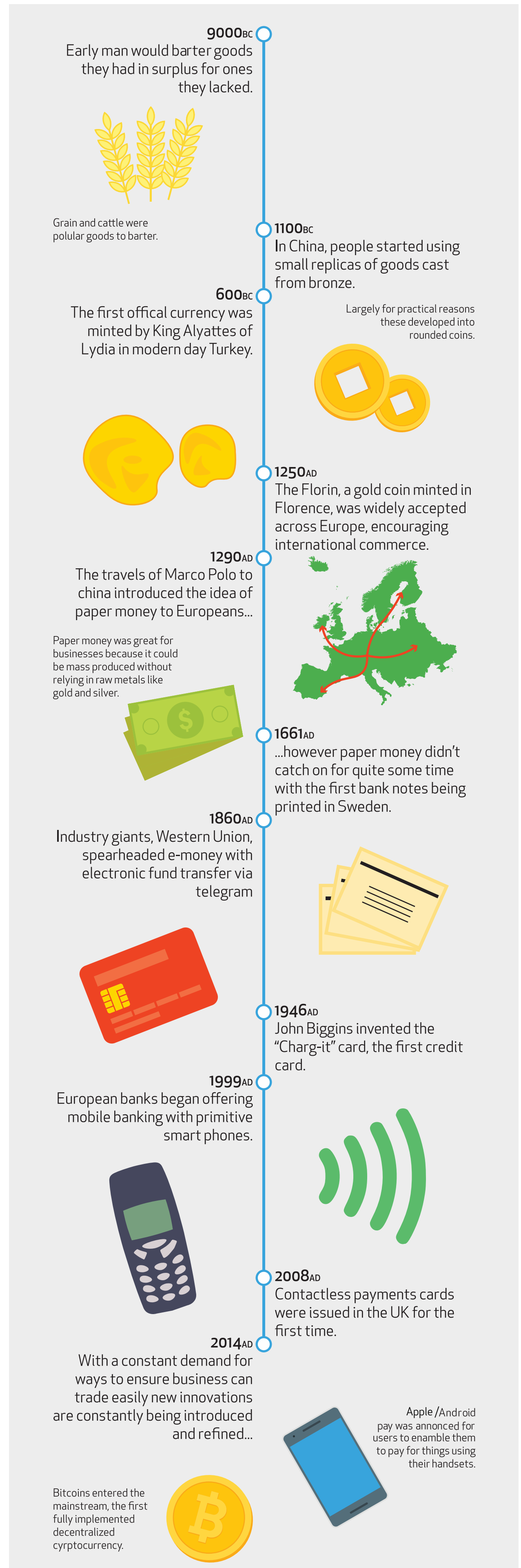
Commercial Blockchain

Despite its potentially great impact, blockchains would not necessarily be completely disruptive, mostly finding widespread use gradually, as it is better understood when and how to best utilise them. For instance, it does not seem like blockchains will replace cloud solutions anytime soon, however they could act complementary, as blockchains can provide a cheaper or better service for some tasks that are currently done via the cloud. Cloud service providers have already recognised this and invested in the technology, with some allowing blockchain-based add-ons, while others are offering Blockchain-as-a-Service (BaaS). Keeping its characteristics in mind, there are a few areas for its use in the immediate and near future. Private blockchains are already used in some companies for sharing internal documents. Similarly, sharing data between institutions could be significantly simplified, for instance banks exchanging data of shared customers more easily. Most notably, financial systems should see increases in productivity, with automation of many operational and managerial tasks based on transactions. An issue here is confidentiality, as it might be identifiable that a transaction has taken place, which is deemed too great a compromise for some types of transactions.

Cryptocurrency

Cryptocurrencies today are still mostly used for speculative trading and investing. Even some commonly used online services enabling payment with Bitcoins are somewhat diminishing the benefits of the technology by adding an intermediary party. We feel that if a compelling use case, or a killer app, for consumers arises, it could trigger part of the economy switching to cryptocurrencies. This would greatly expand their usability: enabling automation and simplification of payments and other money transfers in a disruptive manner, and affecting tax collection, the insurance industry and healthcare, among others. Even if this never occurs, blockchains should still become an important part in simplifying financial transactions and exchanging information between multiple parties, within companies and between them, before further expansion.

Fig. 2 Are we in a crypto bubble or start of another paradigm shift?



Platform as a Service and Fintech Heroku- Salesforce case study

Philip Kirwan - Chief Technology Officer



registered consulting
partner

*Showoff are a registered consulting
partner of Salesforce*

PAAS

As Cloud usage continues to grow and enterprises continue to see the benefit and problem solving capabilities, Platform as a Service (PaaS) has emerged as a major component of this space. PaaS Infrastructure is purpose-built to enable a FinTech scale due to the complexities that are involved in data, transactions, regulation and integration.

Showoff have been using the Salesforce Heroku platform since 2012 deploying over 150 projects and it is our platform of choice. We are firm believers in using best in class solutions to improve operational efficiency (Dev-ops reductions), improve reliability and handle scale.

Heroku Solution for Fintech Stacks

We believe in the Heroku technology stack as an ideal FinTech platform solution due to a number of important features. It offers high availability and high scalability of both dynos and databases. It offers an ever-growing suite of third party add-ons that can be used to aid development as well as ongoing support operations. Ease of iteration and deployment are a key feature of Heroku and this is something that is vital to Fintechs. Open APIs and scalability are essential in light of the EU payments services directive (PSD2).

Heroku Private Spaces is a network isolated group of apps and data services with a dedicated runtime environment, provisioned to Heroku in a geographic region you specify. This feature within Heroku forms the foundation for security and third party regulation, a key component of data integrity.

The Heroku Platform uses Dyno and buildpack technology to scale multi geography, multi currency, and handle peak volumes and pressure points automatically.

Essentially Heroku enables an API Platform integrating third party software and Data to communicate in a dual flow. This feature of the stack is particularly pertinent in light of regulatory changes imminent with PSD2.

Each Private Space can be selected to a specific region (Tokyo, Frankfurt, Oregon, Sydney, Virginia) therefore bringing services closer to your users and further reducing latency.

Data Security and Heroku Private Spaces

For any modern application, data security is a huge concern. As Heroku is backed by Amazon Web Services, it benefits from their best in class security offerings. All data centers are ISO 27001 and FISMA certified, amongst others. All applications are sandboxed, which means that one application cannot interfere with another. Databases are essentially sandboxed too, which means that while they can be shared between applications, they are given unique credentials which must be known by an application in order for the database to be accessed. Private API features will only allow services accessible from internal networks and APIs.

Building your solution within the **Heroku Private Space** will allow your FinTech to iterate at a faster pace. Hence we see it being important that teams can focus on product and monetisation and not infrastructure.

Fig. 3 Fintech Solution Architecture & Topology

Application

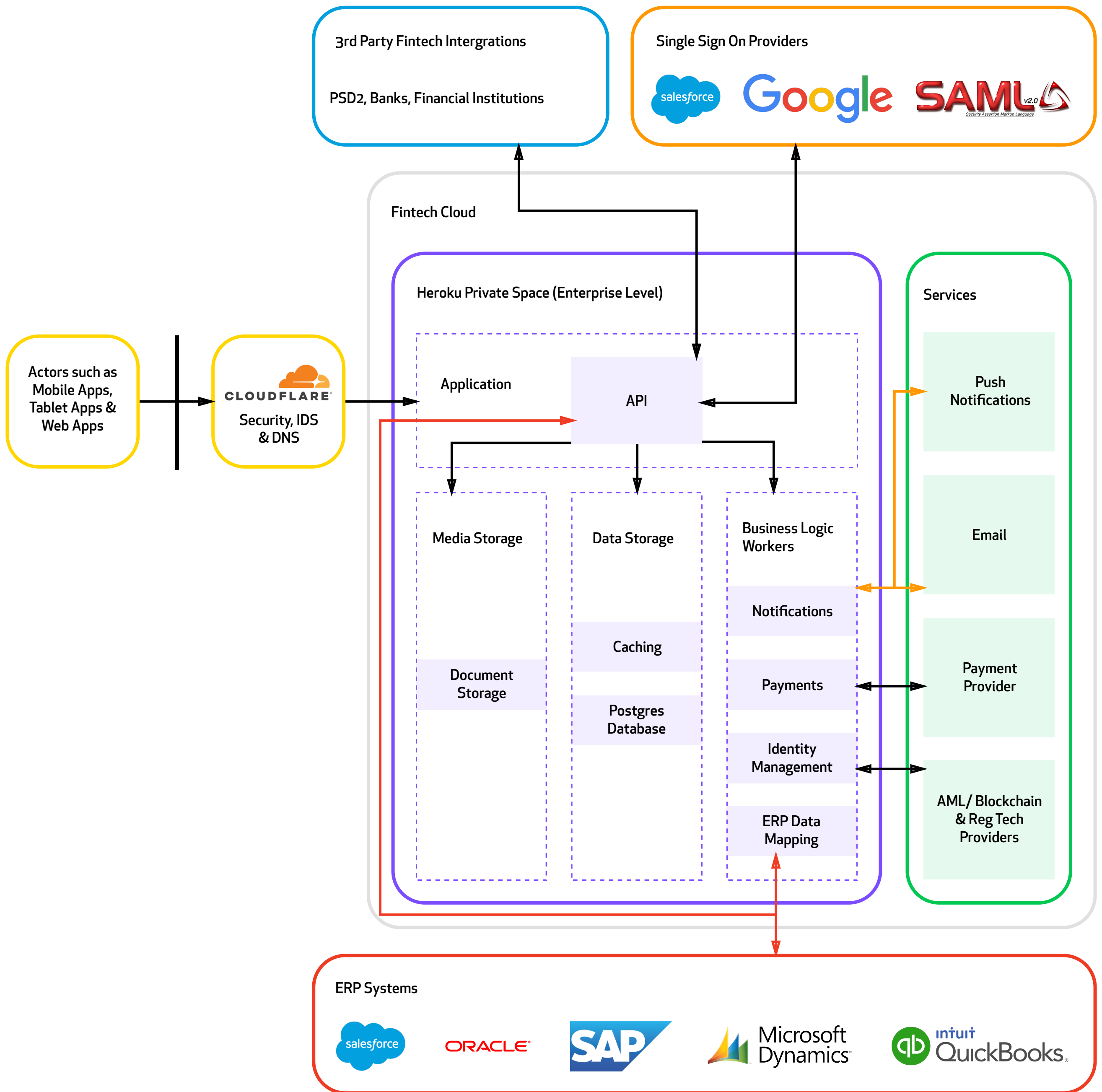
The front end application will be a lightweight API client that will send/retrieve data to/from the platform API. This architecture will offer the optimal experience for the user given that it will be quick as data is only loaded when required. This type of architecture is fundamental to any well architected platform, it allows for speed, performance and extensibility in the future.

API

The API is the core of the whole platform. It is the means of communication with front end applications and other services. This will be developed to be lightweight in nature, only providing the minimal amount of information required to reduce response time and data size.

Media Storage

Proposed Amazon S3 to store any media associated with the platform. This can be user profile images, documents generated, etc. Documents and Image can be stored in encrypted format using Amazon's built in storage encryption mechanisms such as AES256.



DATA STORAGE

Caching

Redis will be used to cache data that is required on a continuous basis. The platform will take advantage of Redis as a key value storage bin to store data. This data can be kept in Redis for a set period of time and removed from Redis after that period of time.

Postgres Database

The platform will use Postgres as its database of choice. As with the hosting on the platform we will use Heroku Private Spaces Postgres. This adds another level of security to the data storage.

Business Logic Workers

The business logic workers outlined in the architecture diagram are asynchronous workers that run independently of the core API. These workers are triggered by actions in the core platform and related to specific domains such as notifications, payments, data synchronization, etc.

APIs & Banking Integration

Denis Ryan - Chief Growth Officer

“Architecting your FinTech stack should be done with Anti-Money laundering, Fraud, regulation, integration, encryption all at its core”
Denis Ryan

Third Party Intergration

In addition to choosing a platform and technology stack as outlined above, a key question for the majority of FinTech builds is how they will integrate with third parties. API integration is important internally and externally. Increasingly the tech stack can be filled with third party technology providers which can free up developers and founders to focus on their core functionality. “Banking as a service” to take the term can be very much part of your platform as you build out a tech stack with a variety of third party APIs. Our approach here is multi solution platform where the Fintech completely and independently owns their platform but it is backed by Banking Providers and third parties. This allows vendor lock in risk to be reduced.

Bank - Incumbent or Opportunity

One important integration (that is both an opportunity and an incumbent) is with the banking and clearing ecosystem. Having a mature and progressive relationship with a banking partner is vital and

something that is often not fully leveraged by Fintech startups. While there has been notable exceptions and an increasing awareness of “smart” investments and strategic partnerships in this sector it is still worth considering arranging your stack and offering with bank partnership or integration in mind from day zero. Whether this is interface or API led - your stack needs to be built to accommodate legacy infrastructure which banks possess. As a team is created to build out a technology solution it should not be done in isolation from the banking system in which it will operate.

Fintechs often have an oversimplified view on how easy it is to create a challenger product offering. Regulations and access to banking clearing cycles is something that Fintech challengers can underestimate. Technology in tandem with deep sector and regulatory knowledge is vital to create trust, security and reliability.

Banks have built up knowledge and relationships over decades with central banks, regulators, and clearing houses in other jurisdictions. This is something that

Fig. 4 API Diagram

INTERNAL API

(Agility)

Meet demand for mobile and social apps: iPhone, iPad, Android, Facebook, Twitter

PARTNER API

(Collaboration)

Deliver on backlog of business development opportunities with customers and partners

OPEN API

(Innovation)

Inspire worldwide community of application developers to create new profit opportunities

Fintech challengers will find as an impediment. Both bank and FinTech are increasingly realising there is mutual advantages to working together. A great example of this is the recently launched Barclays Rise Programme in London.

It is not good enough in such a heavily regulated

environment to just solve a problem. Can the solution scale and handle the regulation onslaught? A perfect example of this is found in the payment service provider space - the need to ensure that it can balance speed of delivery with compliance and regulation is a core challenge to keep regulators and investors happy.

Why Application Programming Interface (API) matter

As you build out a distributed infrastructure your aim is to create a stack of third party software components that comprise a logically complete platform for supporting an application or running a service.

What is an API

An API is an Application Programming Interface which specifies how programs should relate to one another. APIs contain protocols and tools for building software applications. APIs can be released to 3rd party developers to allow them to develop tools to either query a database or to develop add-on programs that will enhance a user's experience, or allow more efficient interpretation of data.

Make your API Developer friendly

If you do not make it developer friendly, it will cost you in the long run. Philip Kirwan advises that *"failure to architect the platform correctly will cost in the long run. While considering your API architecture the business needs should be considered such as strategic partners, multiple clients, exits etc."*

Michael Dever , Senior Showoff backend developer, stresses that *"a well defined API can serve as the backbone of a suite of applications. This approach allows for the heavy lifting needed for most applications to be defined once, in one place, allowing the clients to only handle presentation of data"*.

Why APIs matter

- Enables apps and clients to be displayed in a light weight fashion
- Allows the platform to open up services to third parties
- Facilitates scale, Payment Domain, Data Layer, Business Logic etc.
- Allows movement away from monolithic to layered architecture

Trust

APIs are an important tool for supporting data protection and security (Make sure your platform uses industry standard identity provider mechanisms e.g OAuth2 or third party providers like Salesforce or Google for single sign on.)

Closing Statement

Speaking at the MoneyConf in Madrid recently, BBVA chairman [Francisco González](#), said that transforming the bank *“is not just a matter of platforms. The big challenge is changing an incumbent into a new digital company”*. Fintech companies are evolving and banks are doing their best to stay in touch with new technologies. Within this context the winners are companies and founders who manage to create the correct technology stack for their product and offering bearing in mind the ecosystem in which it will operate from a regulatory, AML, banking and scale perspective.

Which technology platform you choose depends on the problem you are solving. Blockchain technologies offer an interesting possibility for automating some transactions and operating processes, and decreasing costs for businesses and individuals. However, they are still unregulated and require further development to be able to handle greater scalability that is required in the demanding space of finance and technology. Platform as a service such as Heroku have considerable advantages to allow scale, ease of deployment & security. Banking as a service solutions will make sense as an integration for certain projects too.

It is a very exciting time to be building out a technology solution for the financial services space. Our key message is to ensure you have the correct infrastructure that will assure performance, security, reliability and scale.

**“We love all things FinTech in Showoff,
If you would like to discuss a project or
have any queries please get in touch”**

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