

# North Shore .NET User Group

OUR SPONSORS



BUILD AND RUN  
BUSINESS APPLICATIONS

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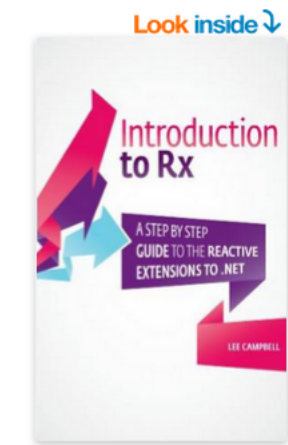
# Reactive Systems

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# Lee Campbell

Author of eBook and website [IntroToRx.com](http://IntroToRx.com)

Consultant at Adaptive



Get the Free Kindle App

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## Introduction to Rx Kindle Edition

by [Lee Campbell](#) (Author)

★★★★★ ▾ 10 customer reviews

▸ [See all formats and editions](#)

Kindle  
\$1.51

1 New from \$0.99

A step by step guide to the Reactive Extensions to .NET. This free book guides the user through all facets of the Reactive Extensions to .NET (Rx), progressively digging deeper in to its features and concepts. Readers will learn about the Rx types, operators and concepts. The book leads the user down a path to

▾ [Read more](#)

Length: [354 pages](#) ▾



# Classic scaling of a web stack

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AN ANECDOTE

Client A Portfolio						£298,841
<b>AAPL</b>	<b>**</b>	\$ 127.61	<b>1,100</b>	\$ 140,371	<b>1.58</b>	<b>£221,786</b>
		\$ 90.00	1,000	\$ 90,000	1.43	£128,700
		\$ 100.00	100	\$ 10,000	1.7	£17,000
<b>MSFT</b>	<b>***</b>	\$ 46.23	<b>1,000</b>	\$ 46,230	<b>1.6</b>	<b>£73,043</b>
		\$ 42.00	1,000	\$ 42,000.00	1.52	£63,840
<b>ARM</b>	<b>***</b>	£ 11.46	<b>350</b>	£ 4,011.00	<b>1</b>	<b>£4,011</b>
		£ 10.00	250	£2,500.00	1	£2,500
		£ 11.00	100	£1,100.00	1	£1,100

# Client A Portfolio

**AAPL**      \*\*      \$ 127.61

iWatch delivers sales despite  
cool reception

**MSFT**      \*\*\*      \$ 46.23

Win10 anticipation strengthens  
position

**ARM**      \*\*\*      £ 11.46

Intel phone processors spook  
investors

# Can you just add Rx?

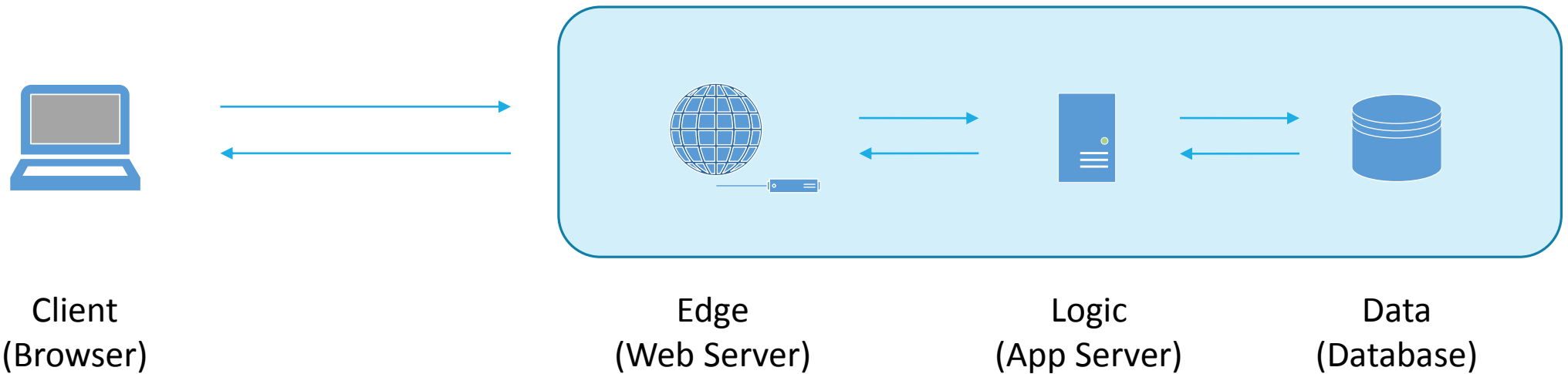
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Can a new CSS file create a good user experience?

Does applying TLS/HTTPS mean a site is secure?

# Classic web stack

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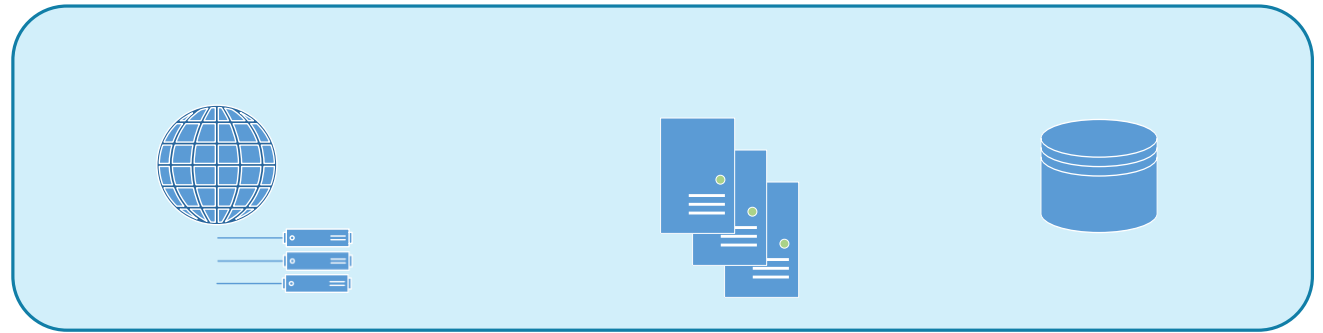


# Scaling classic web

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Client  
(Browser)



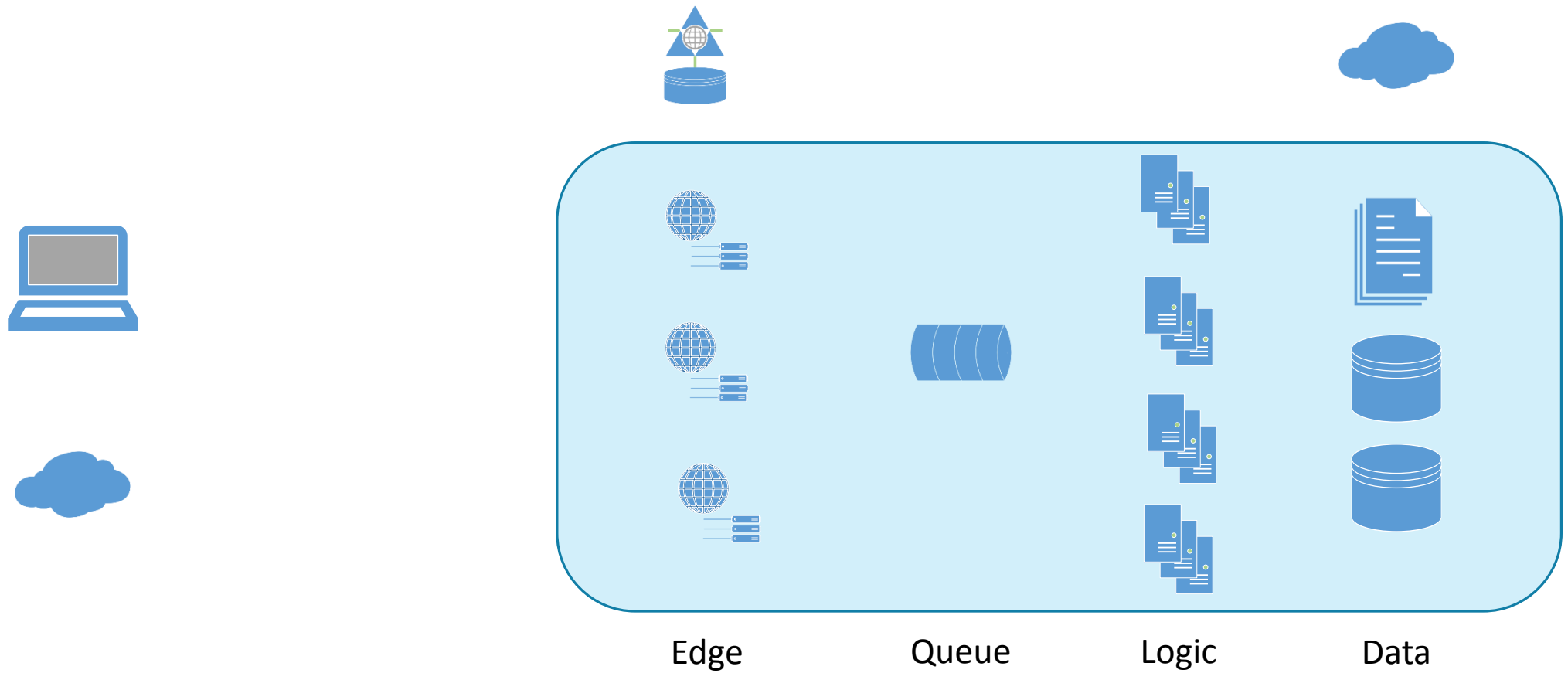
Edge  
(Web Server)

Logic  
(App Server)

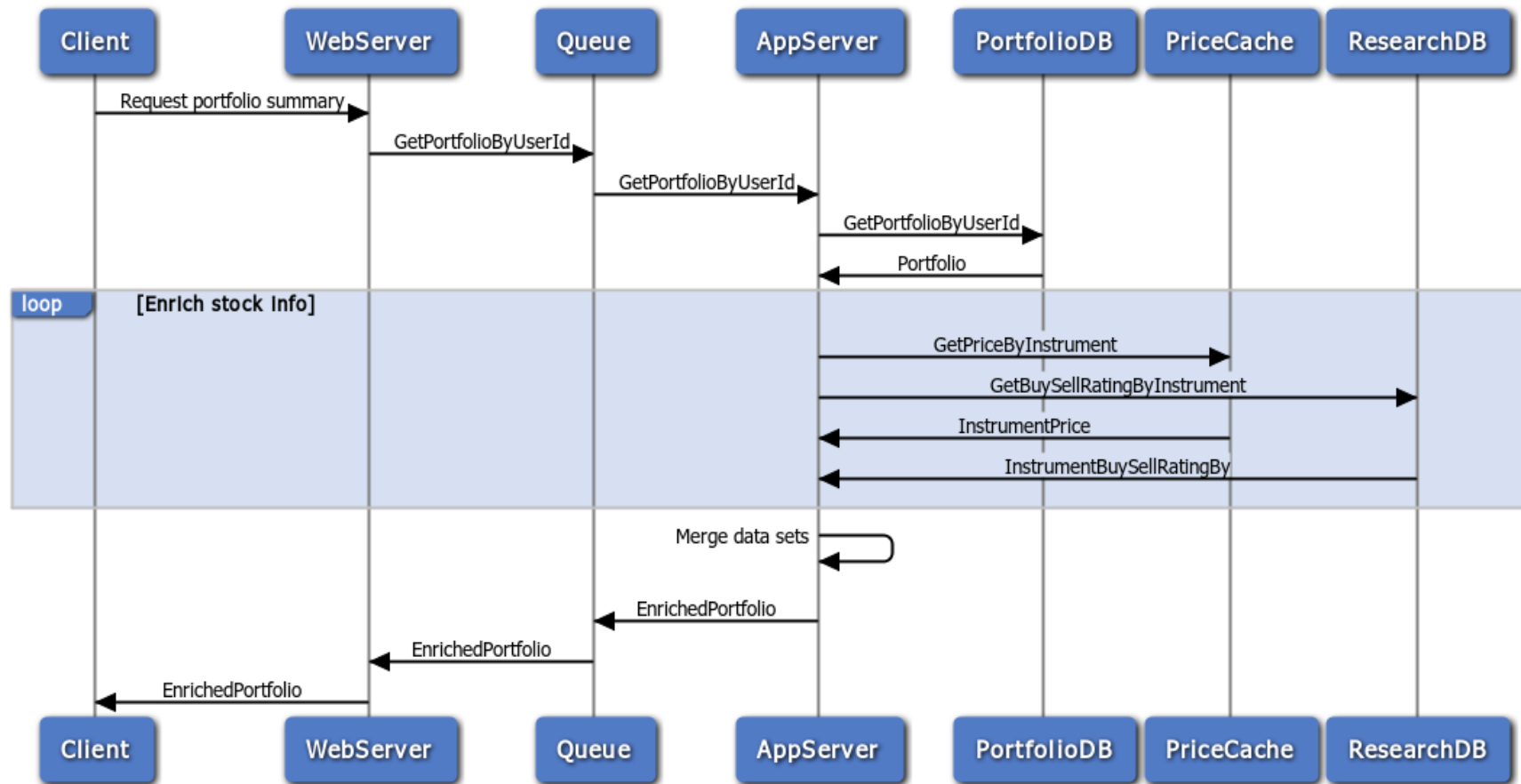
Data  
(Database)

# Web 2.0

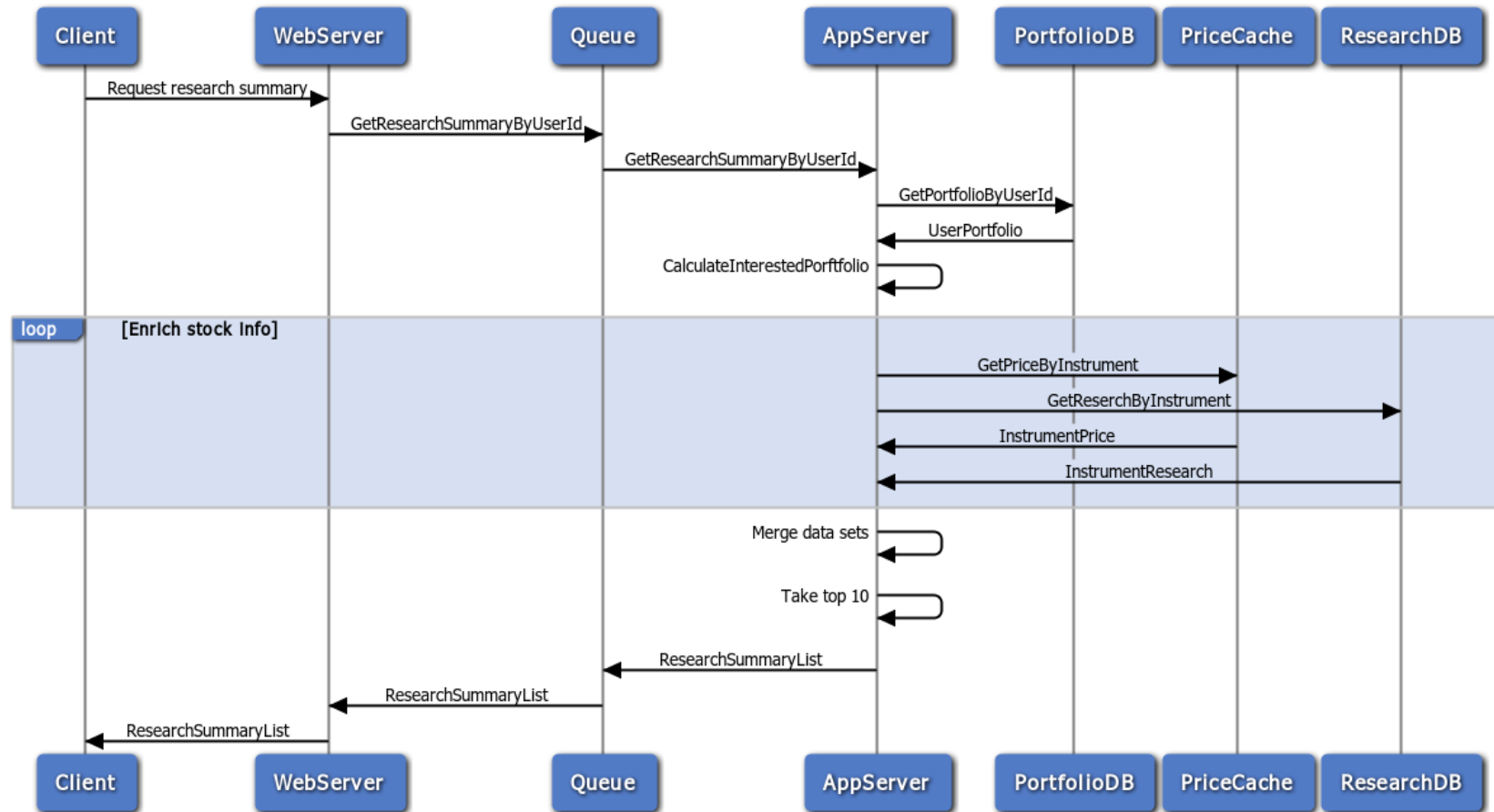
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# Portfolio Flow



# Research Flow



# Static presentation of Dynamic data

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Data driven

User's start to generate content – Cart, Email, comments

User navigates, refreshing content

Cache friendly

# Why HTTP?

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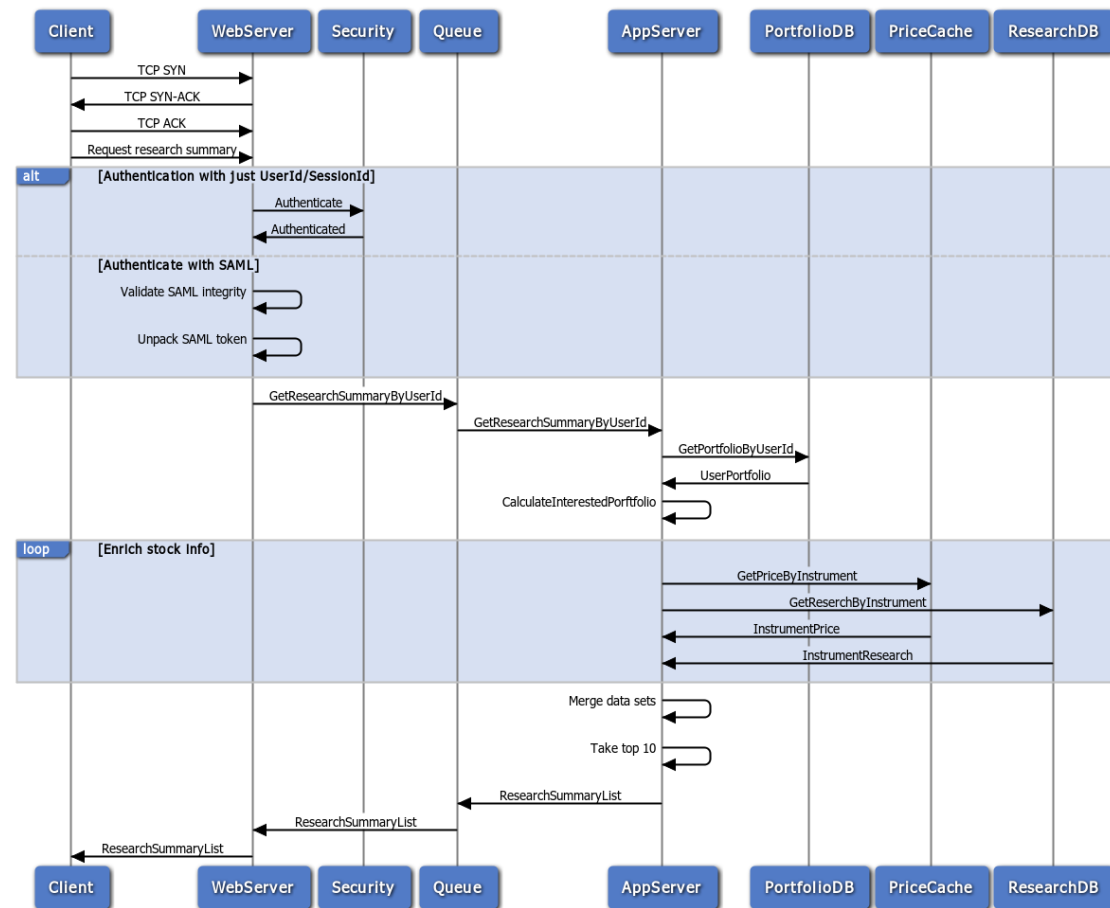
What it provides:

- Request Response
- Hierarchical remote file system protocol
- Designed to serve static content
- Disconnected and stateless

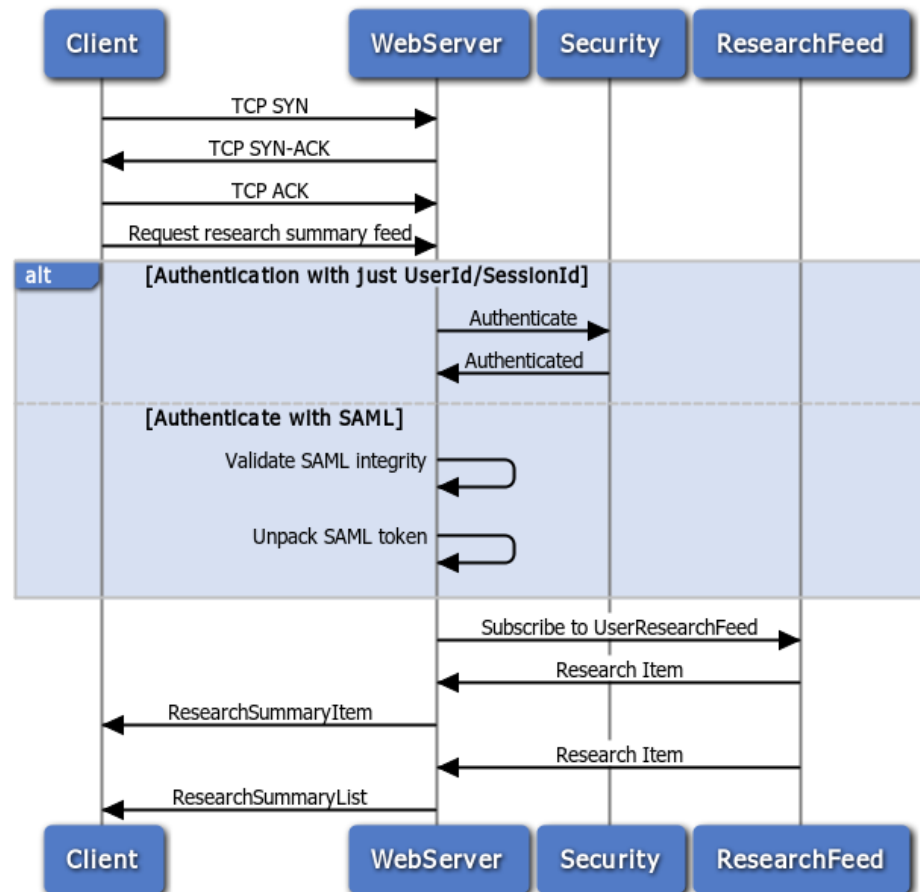
What is needed

- Change notification (push)
- Streams of event data
- Connected

# Research Flow + TPC + Security

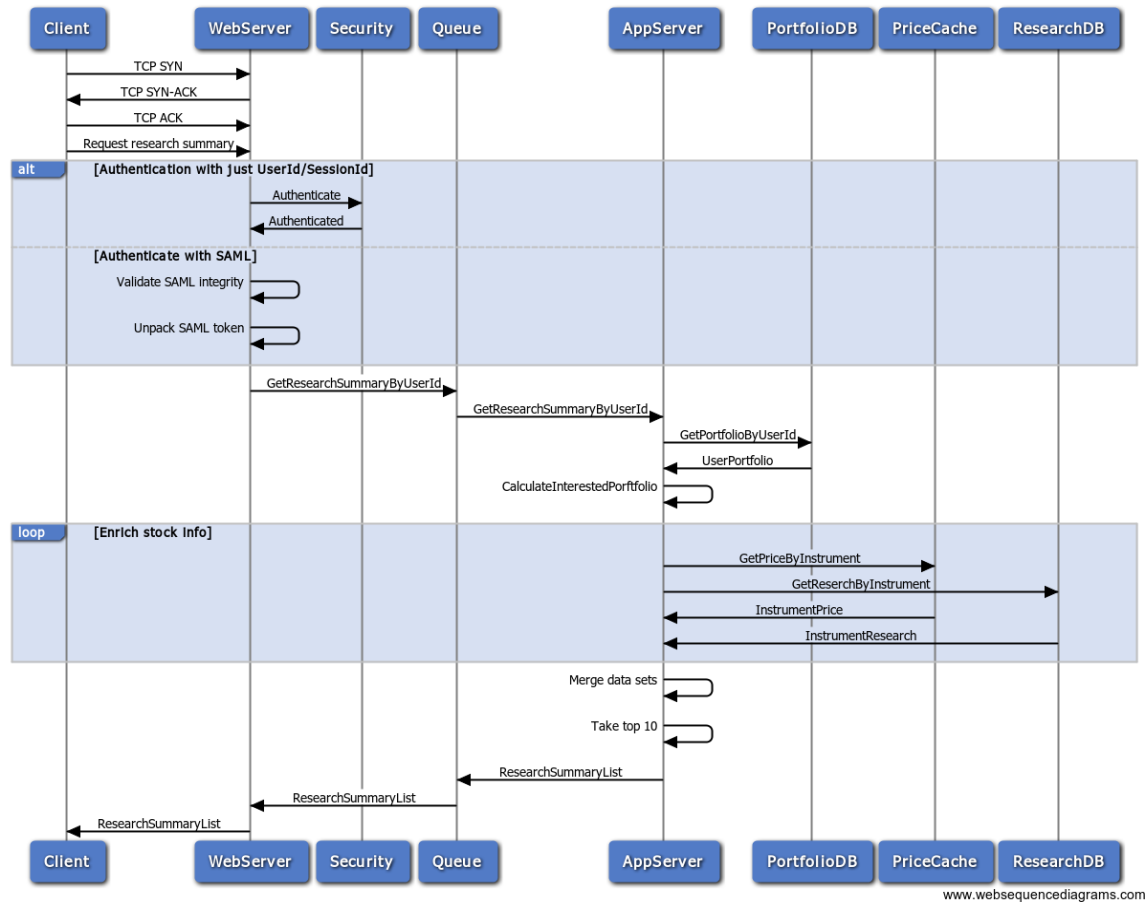


# Research Flow - Push

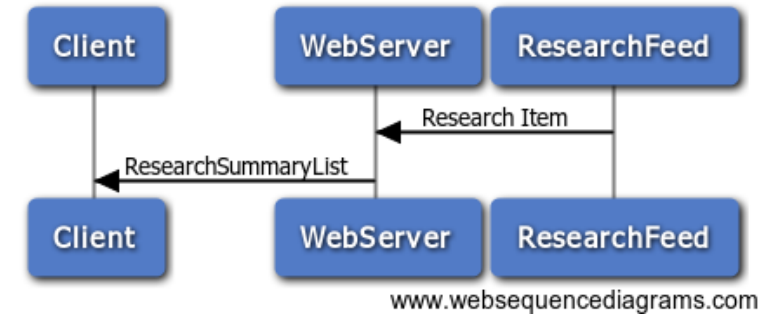




# Current/Polling



# Proposed/Push



# But ...

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How does data get pushed from the data store?

What if the client gets disconnected?

Do they have to wait until a value changes before they see any data?

What if the user's permissions change while they are connected?

# New problems

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“State of the World”

Connectivity

Security

Conflation

# Do more, do less

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RIGHT TOOLS FOR THE JOB

A solid blue horizontal bar spanning the entire width of the slide at the bottom.

# Push Communications

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HTTP Keep alive may mean that you are holding a connection to the server

Web-Sockets will also hold a connection to the server

Server can push data to the client without requests

# Reactive programming

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## Create Queries with Rx

- Observable Sequences
- Creation
- Composition
- Contraction

# Reactive data stores

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Changes to data are broadcast

- SQL Triggers
- Document DB's change notification
- Event stores
  - Works well with CQRS pattern
  - Does not work well with CRUD/REST

# Event Store

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Client Actions	Server Action	Event Stored
Order 100 Apple Shares	Execute BUY (AAPL, 100)	v1, Trade(AAPL, BUY, 100, 112.00)
Order 50 Microsoft Shares	Execute BUY (MSFT, 50)	v2, Trade(MSFT, BUY, 50, 42.00)
Close Apple position	Execute SELL (AAPL, 100)	v3, Trade(AAPL, SELL, 100, 121.34)



# Event Store

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## Version EventStore

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0	Portfolio Created
1	APPL BUY
2	MSFT BUY
3	XERO BUY
4	ARM BUY
5	XERO SELL
6	APPL BUY



Client Version : -1

Client Version : 4

# Event Stores

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Observable persisted sequence of events

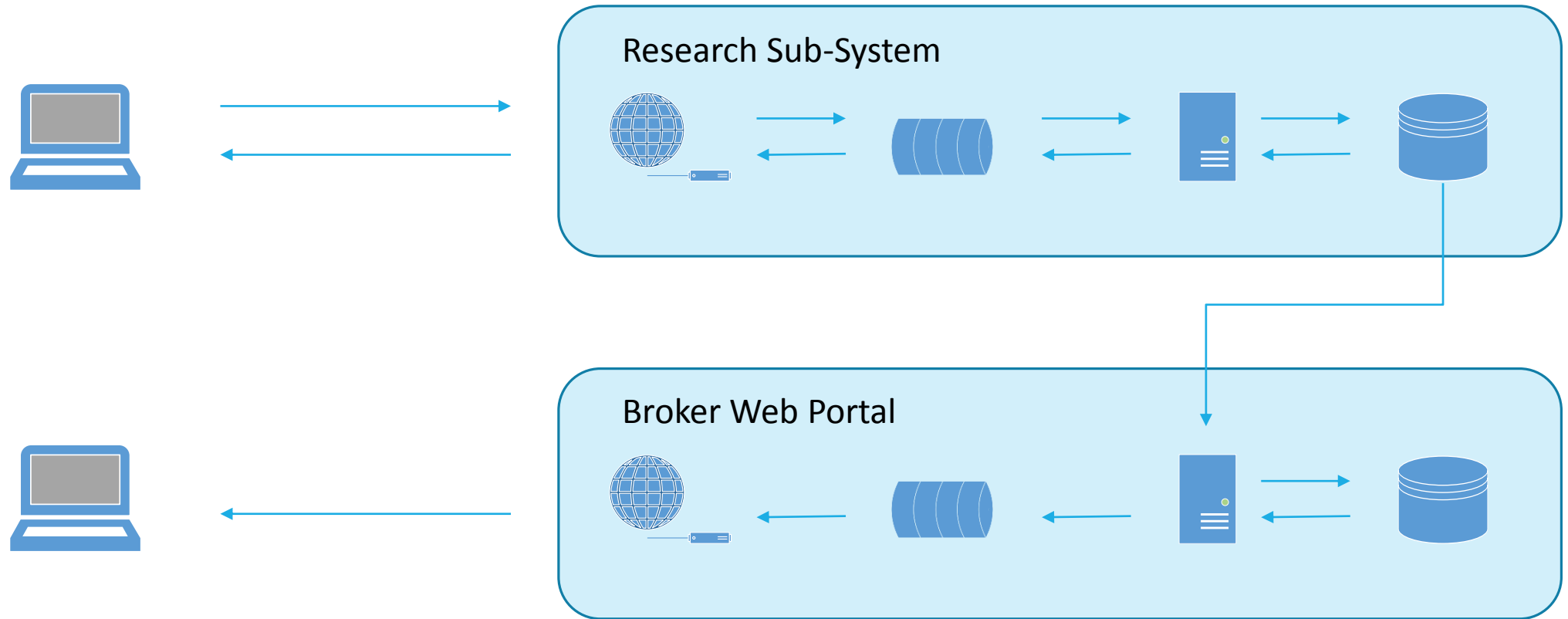
- Stored in linear fashion
- Replayed in linear fashion

Use to deterministically create domain model

Acts as a log of activity

- Trouble shooting
- Debugging
- Performance tuning

# Reactive Web



# Tools – Front end

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KnockoutJS

Angular

ReactJS + Flux

RxJs

# Tools - Communication

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SignalR - <http://signalr.net/>

Universal Messaging - <http://um.terracotta.org/>

Kaazing - <http://kaazing.com/>

Push - <http://www.pushtechology.com/>

# Tools – Reactive Data

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EventStore - <https://geteventstore.com/>

Aeron - <https://github.com/real-logic/Aeron>

Kafka - <http://kafka.apache.org/>

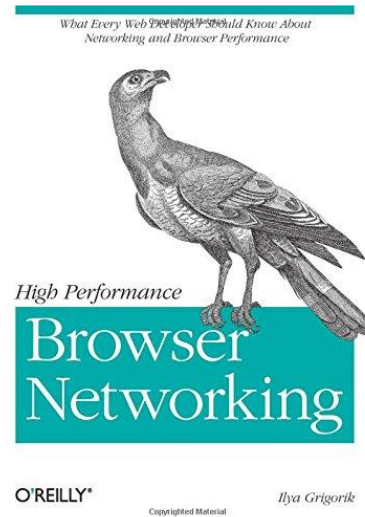
# More information

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The Log : Jay Kreps - <http://linkd.in/199iMwY>

Aeron – High Performance Open Source messaging - <https://youtu.be/tM4YskS94b0>

High Performance Browser Networking



# Thank you

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[IntroToRx.com](http://IntroToRx.com)

[ReactiveTrader.com](http://ReactiveTrader.com)

[WeAreAdaptive.com](http://WeAreAdaptive.com)

[ReactiveManifesto.org](http://ReactiveManifesto.org)



# North Shore .NET User Group

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Next Meeting

<http://northshore.netusergroup.org.nz/Meeting/Meetup/?id=M20150723>