
Dan Pierkowski

My (Recent) History

Liberty Mutual (2/2004 - 8/2010)

IcoSystem (8/2010 - 1/2016)

Brightcove (1/2016-Present)

My (Recent) History

Liberty Mutual

- Contractor -> Senior Software Engineer -> Principal Software Engineer
- Team Lead
- Java/web based business software for in house users
- Introduced Agile development methodologies to Liberty

IcoSystem

Brightcove

My (Recent) History

Liberty Mutual

IcoSystem

- Senior Software Engineer (??), Team Lead
- Predictive Modelling (agent based simulations, machine learning)
- Consulting
 - DoD - Cybersecurity
 - Rockefeller Foundation - Marine Fisheries Conservation
 - US Navy - Manpower and Staffing Simulations

Brightcove

My (Recent) History

Liberty Mutual

IcoSystem

Brightcove

- Principal Software Engineer, “Product Owner” a.k.a, Team Lead
- Online Video Services; Integration with Social Networks
- Java based web services, back office components
 - Cloud infrastructure
 - High availability services
 - Containerized applications

A little bit about me...

I have several years experience leading teams in delivering complete software projects, including requirements review, architecture, technical design, planning, execution, and monitoring of deployed systems. I enjoy working with end users to craft solutions that meet their needs. I have several years experience with cloud computing, containerized applications, and associated deployment technologies. Finally, **I am passionate about software craftsmanship and agile methodologies.**

Interview Assignment

Interview Assignment

- Requirements
 - Functional
 - Non-Functional
 - Technical
- UI Mocks
- Data Model
- System Architecture
- API Design
- Code
- Other Assignment Questions

Requirements

Functional Requirements: User Personas

- Patient
- Office Staff
- Health Care Provider
- Facility Administrator

User Personas

Patient

- When and where are my next appointment?
- When can I reschedule an appointment to?
- Is there anything I need to be aware of prior to arriving?

Office Staff

- Who's appointments are coming up soon? (Who needs to be contacted for reminders?)
- When can I schedule, or reschedule, a patient's appointment?
- Is insurance information up to date?

User Personas

Health Care Provider

- Who am I seeing next, and where? (What's my schedule for today?)
- What procedures are they scheduled for?
- What is their clinical situation?
- Do I need a translator?

Billing Staff

- What procedures were performed? To whom?
- Who is the insurance provider?

User Personas

Facility Administrator

- What is our facility utilization rate?

Non-Functional Requirements

- Expected user load, average, peak
- Expected data growth rate
- COGS
- User management, authentication and authorization
- Audit trails
- Data Security
 - Encrypt data at rest
- Data Locking
 - Optimistic vs Pessimistic?

Technical Requirements Additions: Data Model

Patient

- Medical Record Number (MRN) which is a unique id for the patient
- *First Name*
- *Last Name*
- *Date of Birth*
- Country of Origin
- Primary Language
- *Tumors*
- **Phone Number**
- **Email Address**
- ***Insurance Information***

Chemotherapy Session

- Scheduled visit date
- Scheduled visit time
- *Estimated session length in minutes*
- *Location*
- Chemotherapy room number
- Primary chemotherapy drug
- MRN
- ***Health Care Provider***
- ***Treatment Notes***

[Data Security: Hashing](#)

UI Mocks: Patient

Upcoming Appointments

- Jan 2, 2019 3:00 PM
123 Main St, Mytown, MA
Room 403
Treatment Notes: Fast for 12 hours prior to appointment
[Send to Calendar](#)
[Reschedule](#)
- Jan 16, 2019 1:00 PM
[...](#)
[Send to Calendar](#)
[Reschedule](#)
- Jan 30, 2019 1:00 PM
[...](#)
[Send to Calendar](#)
[Reschedule](#)

First Name

Last Name

Date of Birth

First Name:Jane

Last Name:Smith

Phone Number:(123) 555-6789

Email Address:jane.smith@example.com

Insurer:HPHC Insurance Company

Insurance ID #:AB123456789

Save

Upcoming Appointments

- Jan 2, 2019 3:00 PM
123 Main St, Mytown, MA
Room 403
Treatment Notes: Fast for 12 hours prior to appointment

Send to Calendar

Reschedule

Cancel
- Jan 16, 2019 1:00 PM
...

Send to Calendar

Reschedule

Cancel
- Jan 30, 2019 1:00 PM
...

Send to Calendar

Reschedule

Cancel
- Schedule another appointment

Scheduling: Jane Smith

Jan 2019						< >	

	Room 401	Room 402	Room 403	Room 404	Room 405	Room 406
GMT -5						
9 am						
10 am	busy	busy	busy		busy	
11 am		busy				
12 pm	busy					busy
1 pm				busy		busy
2 pm				busy		
3 pm						
4 pm						
5 pm						

Data Model

Data Model: Which database?

- Why only one?
 - OLTP vs OLAP
- Relational vs Non-Relational
 - Relational
 - Relational algebra
 - Relatively efficient with arbitrary queries
 - Fixed schema with data type limitations
 - Performance issues at high load
 - Non-Relational
 - Polymorphic tables
 - Efficient for predefined queries
 - Poor performance with arbitrary queries
 - Easier to scale and distribute

Data Model

ERD

Analytics

What other analytics could you derive from the data stored on the database?

- What is the utilization factor for a room?
- What medications are being used? How much? What percentage of sessions?
- What medications are being used for patients with a given type of cancer?
- What are the prevalences of cancer types in organs amongst chemotherapy receivers?
- What percentage of our patients require translation services?

System Architecture

Logical and Physical Architecture

- Logical Architecture
- Physical Architecture

Design: Server Frameworks

What frameworks would you use for implementing the web services?

- Mapping incoming requests to handlers.
- Mapping parameters of incoming requests to object.
- Mapping domain object to/from a data store.
- Configuring and versioning the data store.
- Logging.
- Metrics.

What are your standards?

Design: Server Frameworks: Dropwizard

- Jetty for request mapping
- Jackson for JSON mapping
 - Hibernate Validators for validation
- Hibernate and JDBC for data mapping
- Liquibase for database migrations
- Logback and Log4j
- Dropwizard Metrics

Dropwizard uses the Jetty HTTP library to embed an HTTP server into your project. Instead of handing your application off to an app, Dropwizard projects have a main method which spins up an HTTP server.

Design: Server

Server Design

Design: Client Frameworks

What frameworks would you use to implement the front end?

- Dependency management
- Route mapping
- State management
- View management

What are your standards?

Design: Client Frameworks

- Angular?
- React/Redux?

API Design

API Design

API Design

Code

Code

On GitHub

Other Questions

Other Questions

How would you assign pieces of work to developers on your team?

Other Questions

Can you write an example use case you'd hand over to a backend developer to implement? To a frontend developer?

Appendix

Data Security: Hashing

- "John"
- "Doe"
- "1901-01-01"

"John" + "Doe" + "1901-01-01"



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