

Find Your Inner Bounded Context

A case study of breaking up a large monolithic application

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Experience

HMBer

Married father of 2

Software Enthusiast

15 years of .NET Experience

Enterprise Architect

Developer

Scrum Master

Life Learner



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Outline

What are we doing today?

1

Bounded Context

Definition of bounded context and why it is important

Problem

What problem are we trying to solve?

2

3

A Developer's Journey

Case study

Takeaways

Review of practical ideas to be learned from case study

4

1

BOUNDED CONTEXT



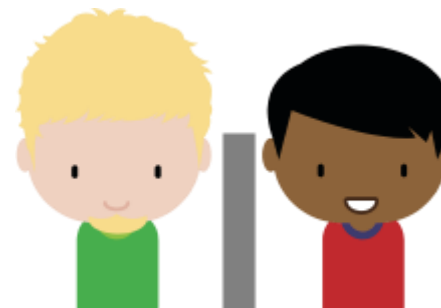
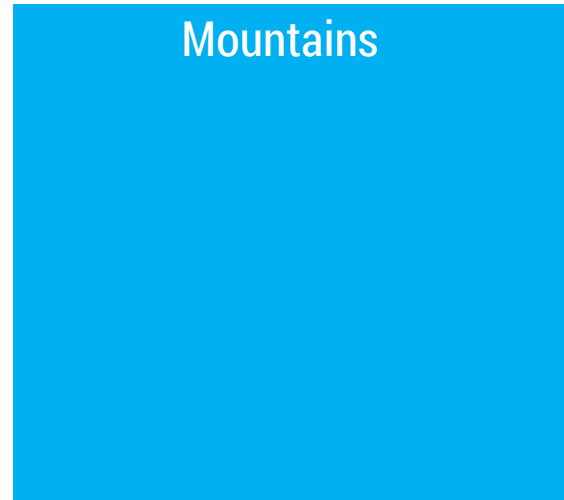
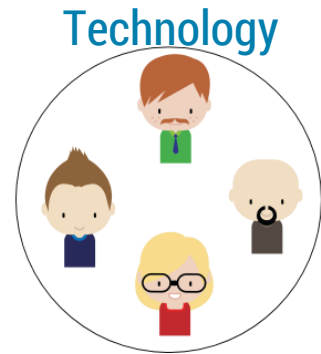
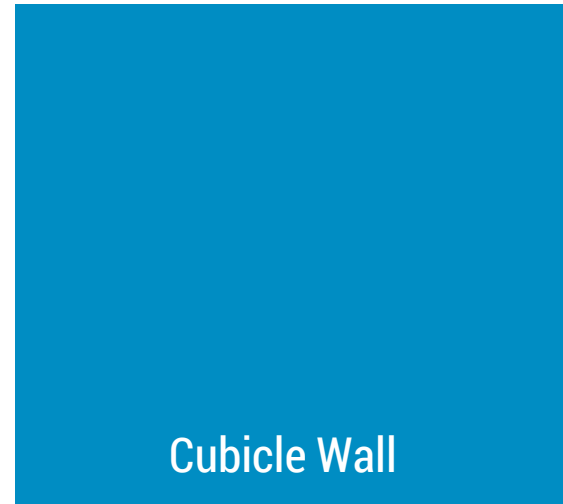
Boundary

Definiton

A real or imagined point or limit that indicates where two things become different.

Boundary Examples

Real or Imagined



Context

Definition

Background, environment, framework, setting, or situation surrounding an event or occurrence, which helps explain its full meaning.

Context Example

Tim concentrated and contorted his face while he created a tweet.

Twitter



Context

We were all amazed at how insightful and concise his tweet was.

Musical

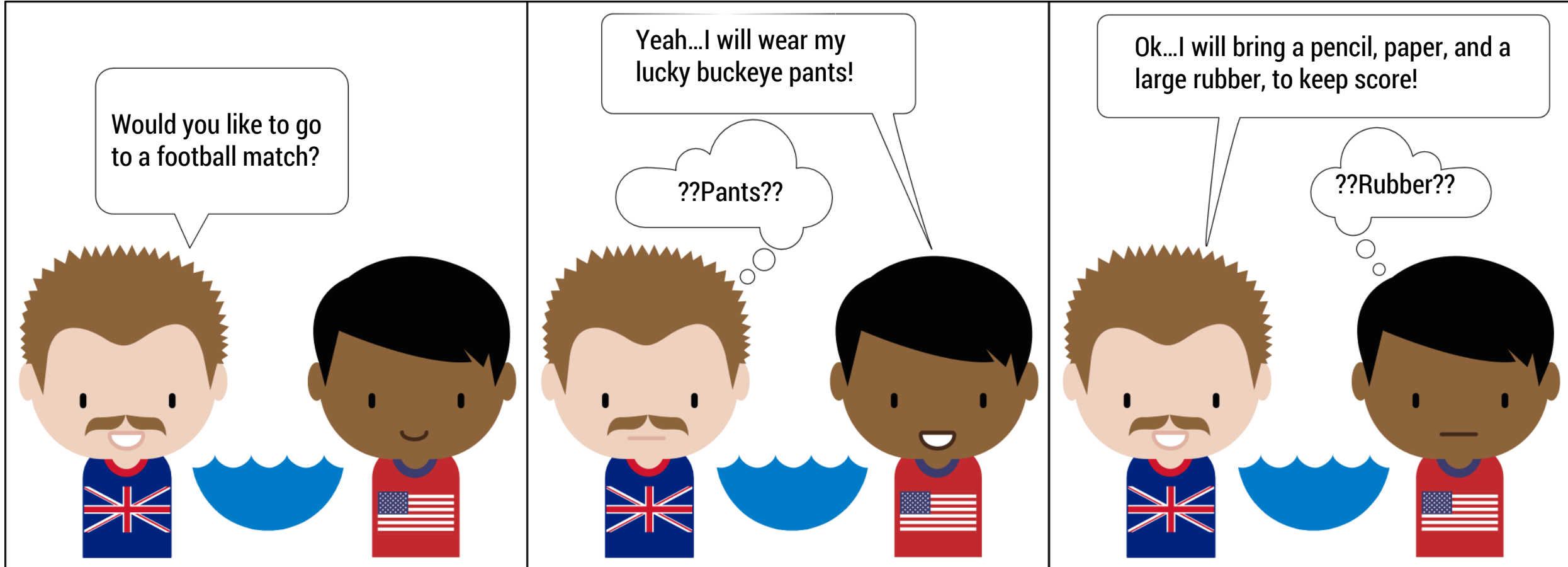


Context

We were all amazed by the sound coming from his face.

A Boundary Without Context

United Kingdom & United States



Domain-Driven Design Bounded Context

Definition

“DDD deals with large models by dividing them into different Bounded Contexts and being explicit about their interrelationships.”
– Martin Fowler



DDD Boundary

- Explicit
- Keeps the knowledge inside consistent whilst ignoring the noise from the outside world
- Formalize interactions between different contexts

DDD Context

Definition

The setting in which a word or a statement appears that determines its meaning.

DDD Unbounded Context Example

Personal Finance Application

Account - Credentials

Login

Account - Money



Apply Context To Software

Models

The maximum extent a model can be stretched without compromising its conceptual integrity is called a *context*.

Ubiquitous Language

DDD – Common, Rigorous, Shared Language

Special condition where every term has a single unambiguous definition.

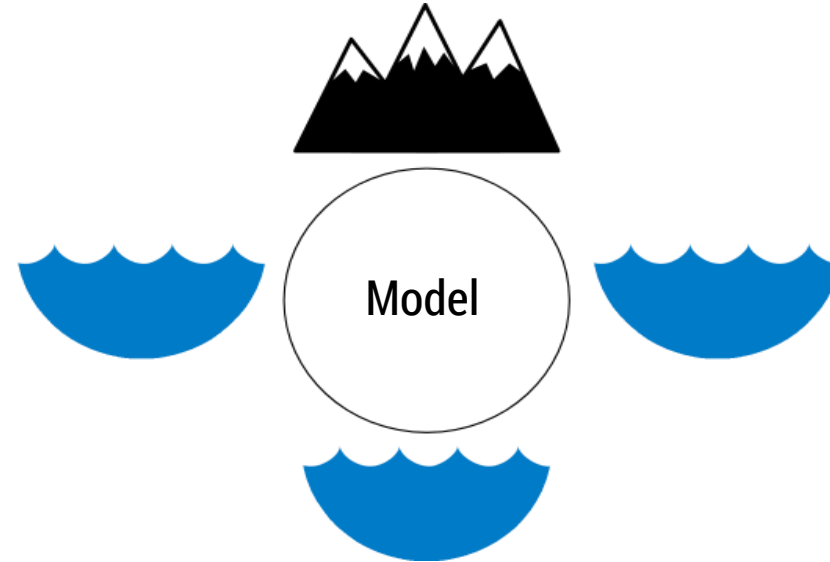
Ambiguity

Super Villain of Ubiquitous Language!



DDD Bounded Context

Bounded Contexts are models with explicit boundaries, where the model is unambiguous within the boundary.



Bounded Context == Language

Defining Bounded Contexts is an exploration of language

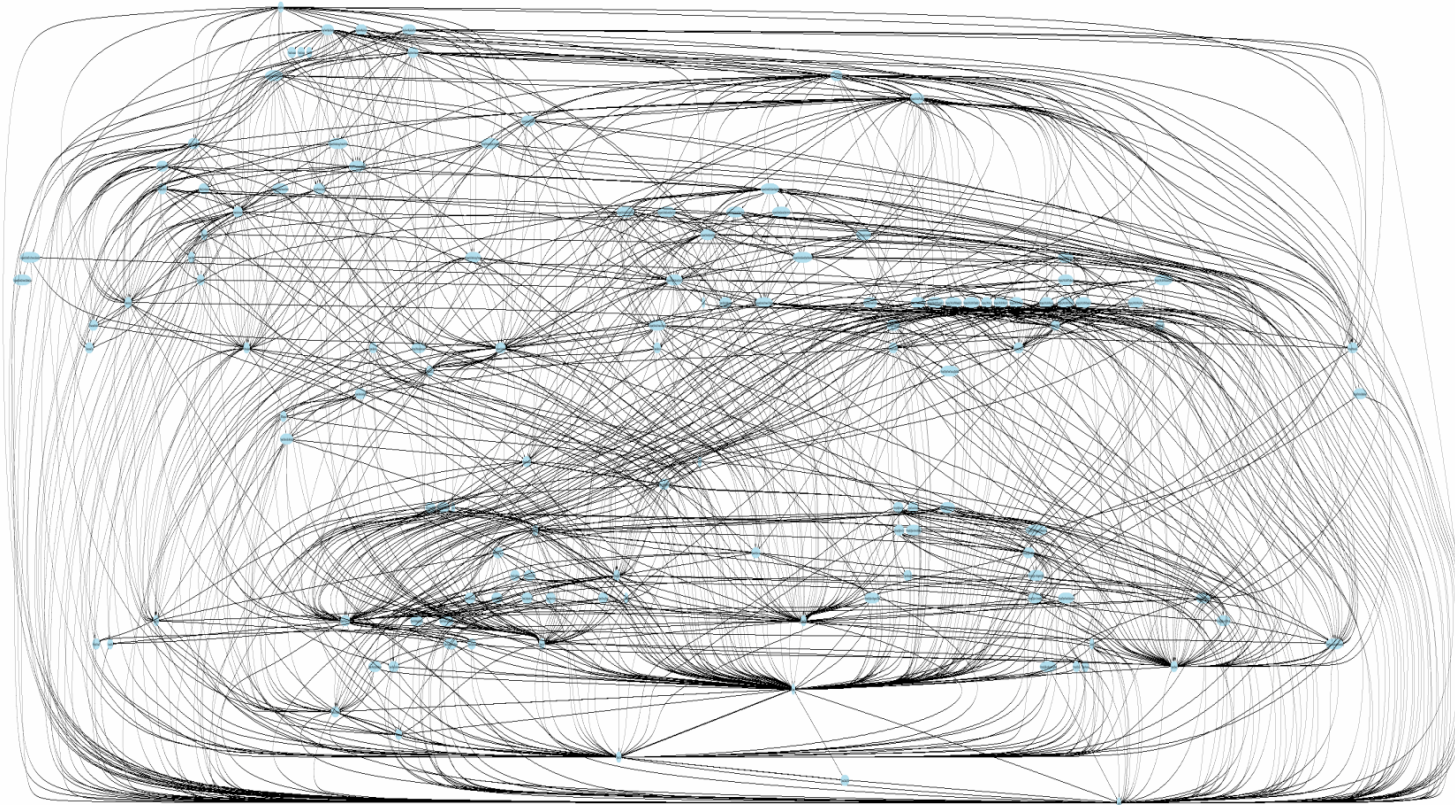
2

PROBLEM



Is this yours?

Coupled Dependency Graph



So What?

- Difficult to change
- Difficult to test
- Difficult to reason about

How did we get here?

- Small changes over time
 - Most systems have a stage when they are small
 - As they grow, they become more complex and difficult to understand

Cognitive Burden

- ~~Developers are the limiting factor~~
- Humans are the limiting factor
- Tools
 - Functions
 - Classes
 - Abstractions
 - Interfaces
 - SOLID
 - Domain-Driven Design
 - Service-Oriented Architecture

Essential Complexity is the Model

- Accidental vs Essential Complexity
- Essential Complexity is in the business domain itself
- Often our issues are not technical hurdles
- Domain – a sphere of knowledge, influence, or activity

Importance

- Bounded Context helps to solve Essential Complexity
- Smaller, more focused model allows for better architecture
- Over time we recognized that “total unification of the domain model for a large system will not be feasible or cost-effective” (Eric Evans)

Application

- Decomposition of problem
- Service-Oriented Architecture (SOA)
 - What use cases should be grouped together? Bounded Context.
 - A service should not cross a bounded context.
- Micro Services
 - How to define what is included in a micro service? Bounded Context.
- Command Query Responsibility Segregation (CQRS)
 - What entities should share code? Bounded Context.
- RestFul Services
 - Which resources should be grouped together? Bounded Context.
- Data Access
 - How do I create a data access layer without a one to one relationship with the database? Bounded Context.

Cost of Bounded Contexts

- Identifying Bounded Contexts requires significant effort, so focus on your core business
- Many large business applications would derive value from utilizing Bounded Contexts

3

A DEVELOPER'S JOURNEY

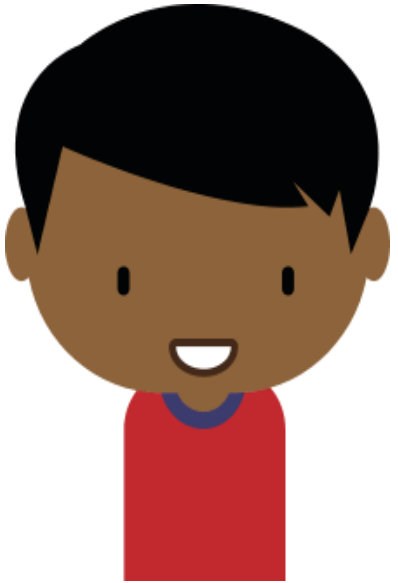


A LONG TIME AGO
IN A FAR AWAY PLACE.

Colorado

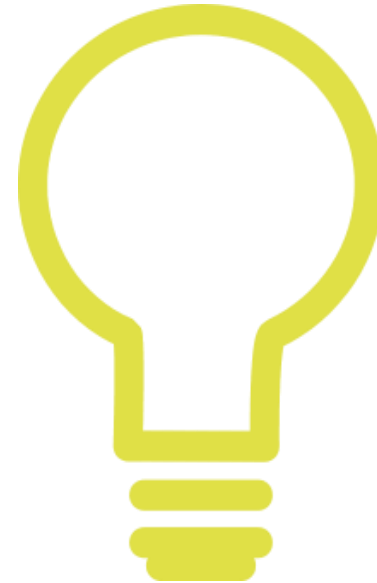
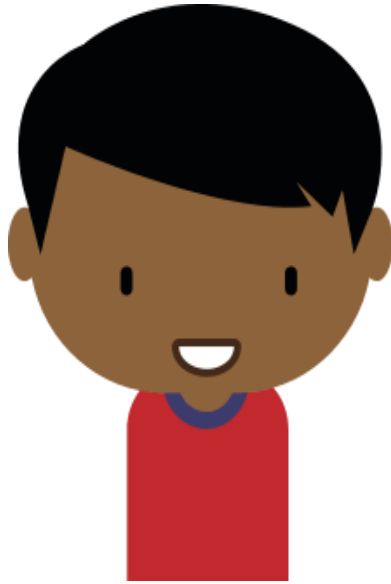


Developer

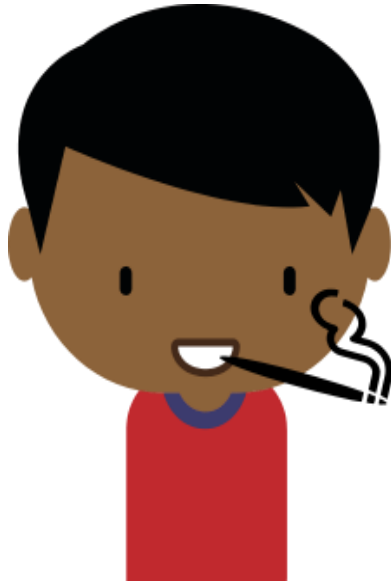


Tim

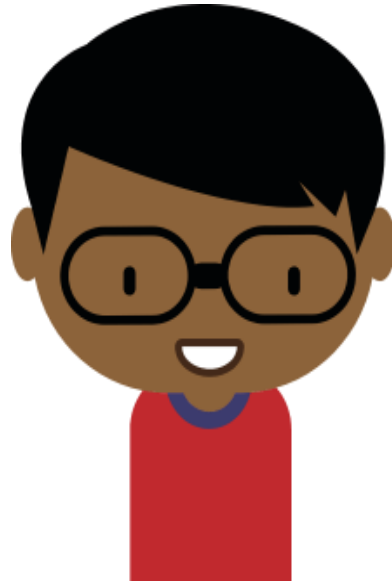
Tim is Reasonably Bright



Marijuana is Not Legal

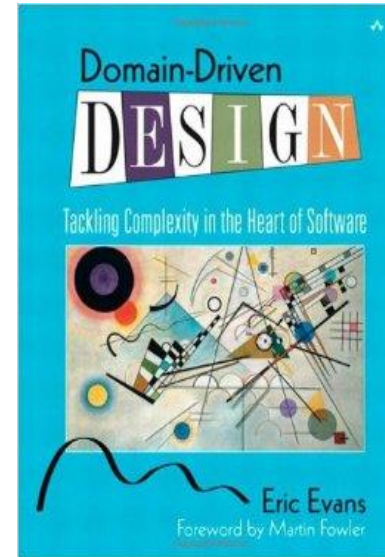


2009



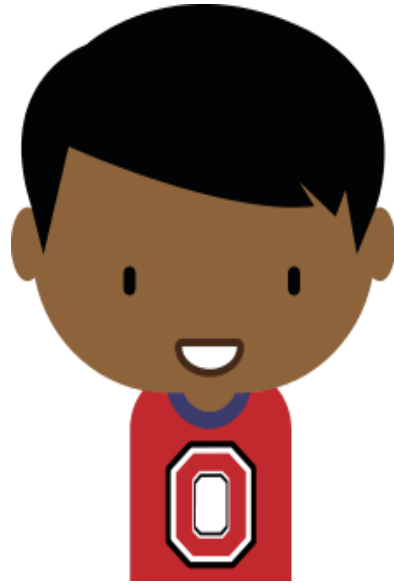
Yes Tim can Read

But only read Chapters 1 - 11



Domain Driven Design

New Opportunity



Consultant
Working for local government



Colorado

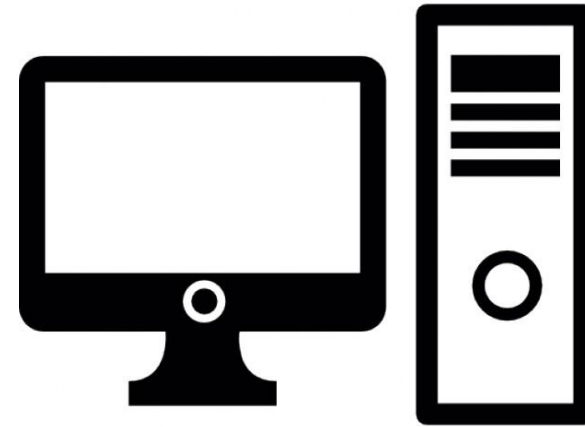
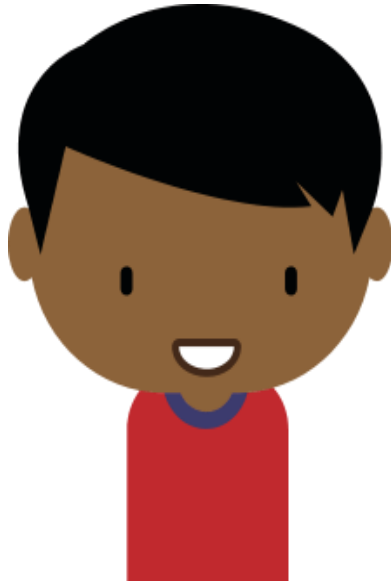


Ohio

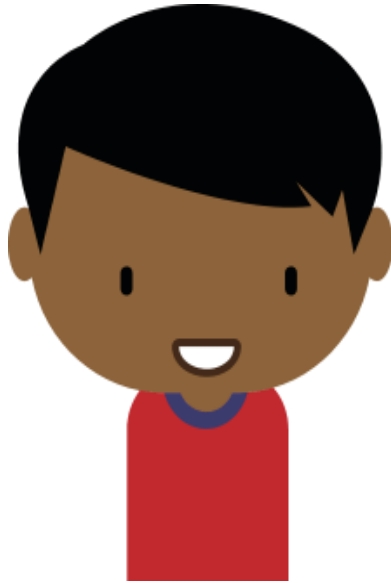


Healthcare. Inc.
.Net Developer for health insurance provider

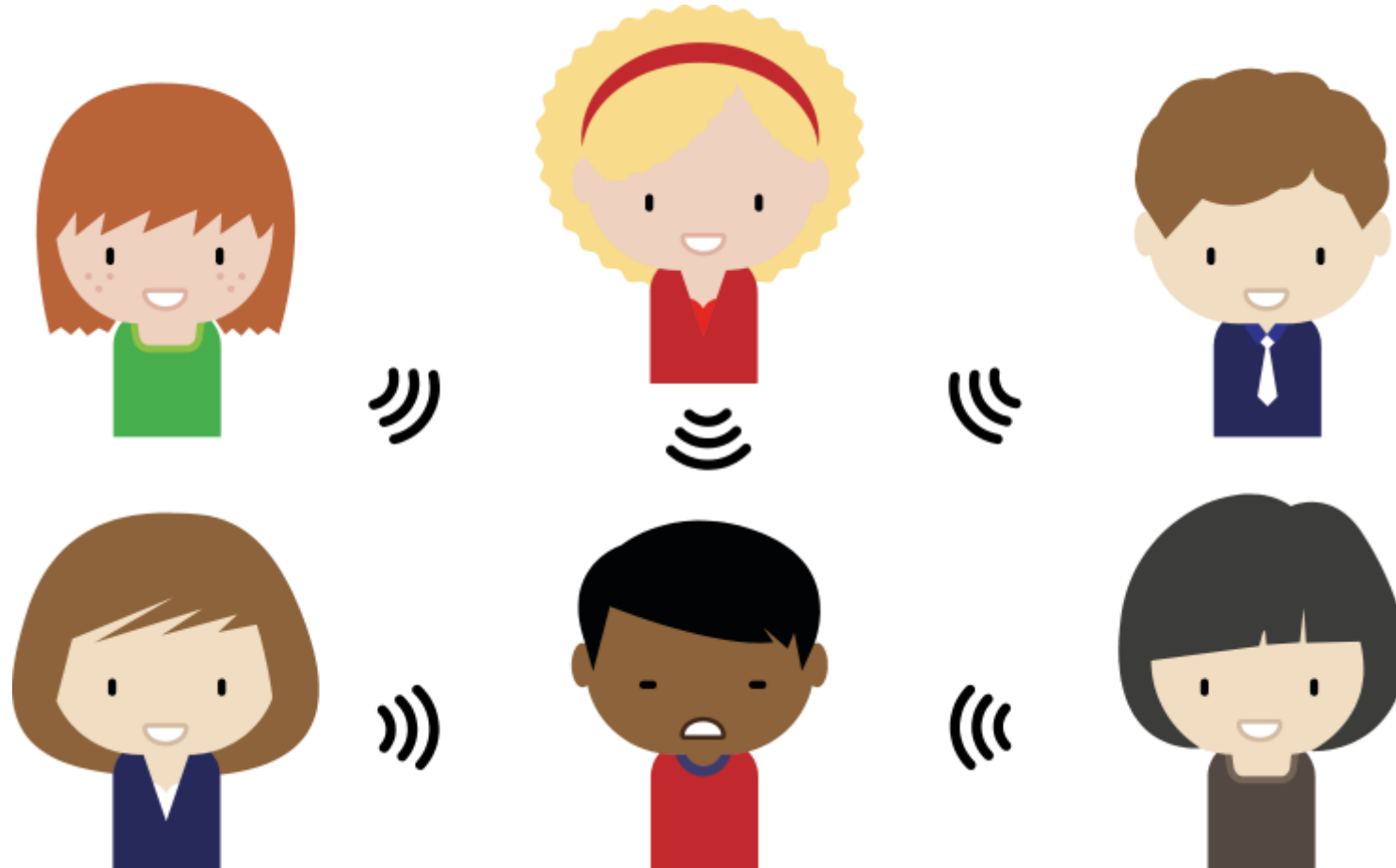
Tool On Boarding



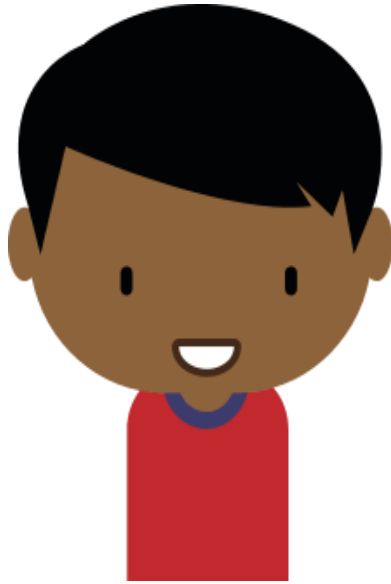
Technical On Boarding



Application On Boarding

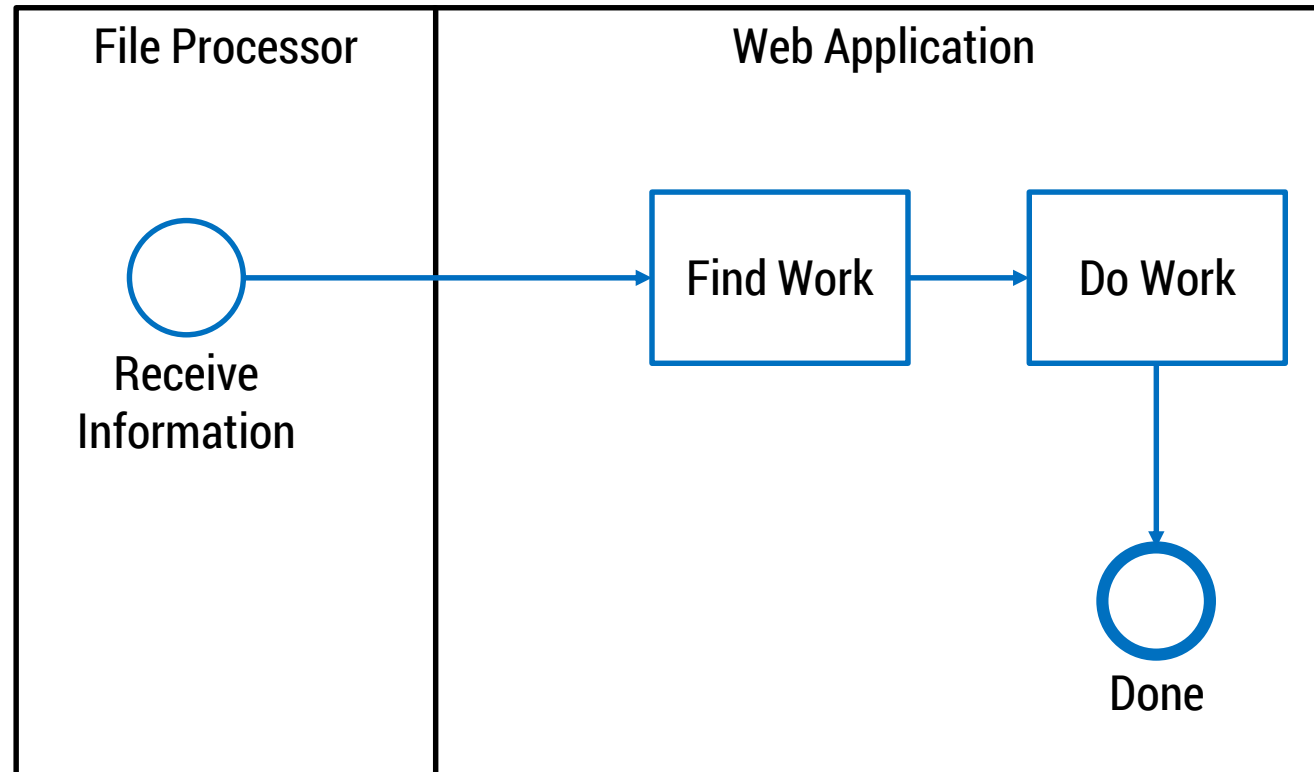


Cerberus

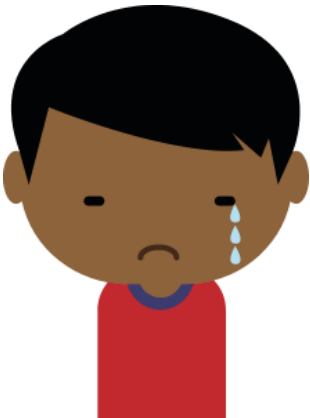


Tim's Mental Model 1

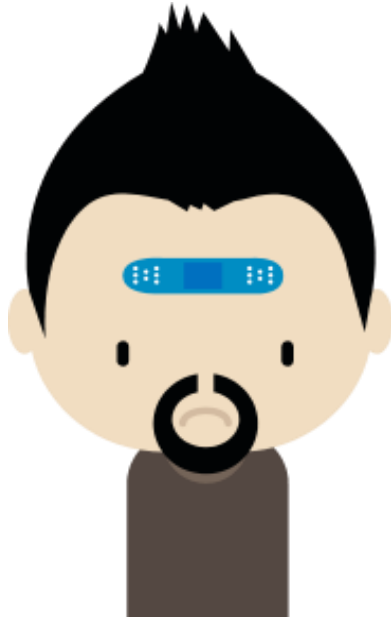
Cerberus



The Code

[illegible]

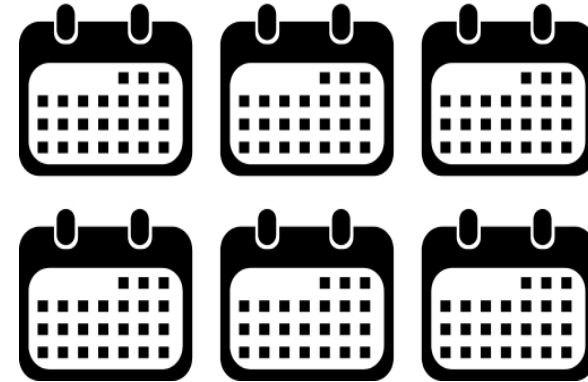
Medical Event



Timer Started



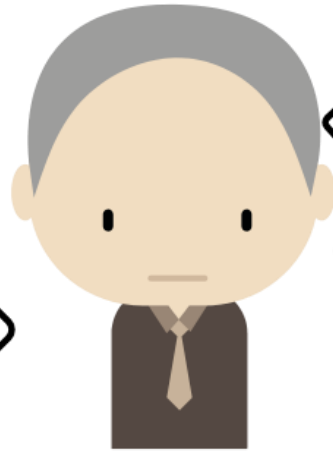
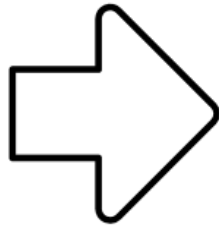
Overpayment



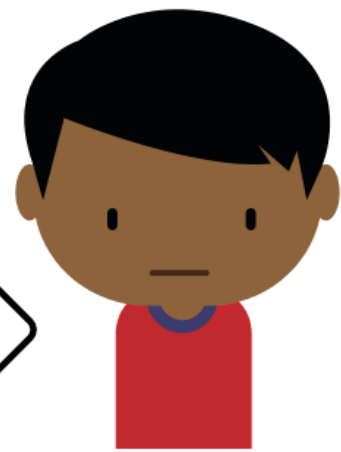
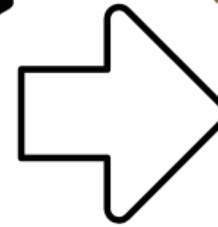
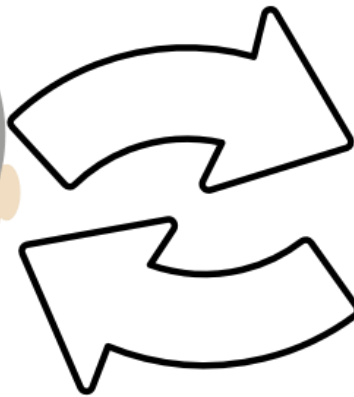
Communication Pattern

Business Owner

Business Analyst

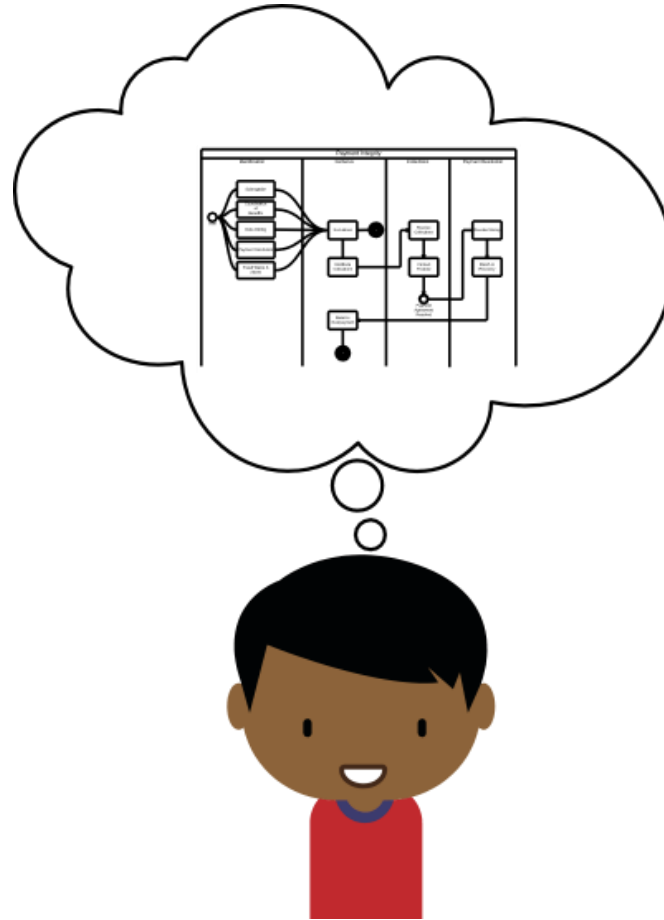


Business User

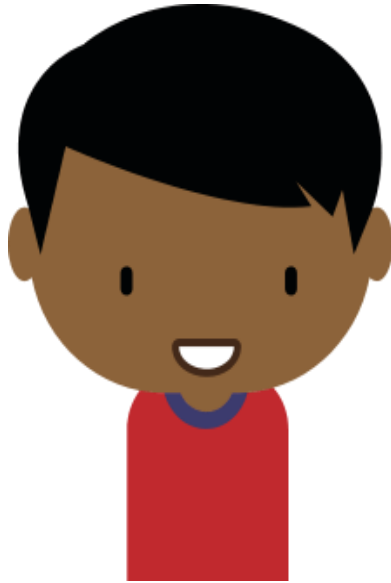


Developer

Mental Model Is Context



New Project



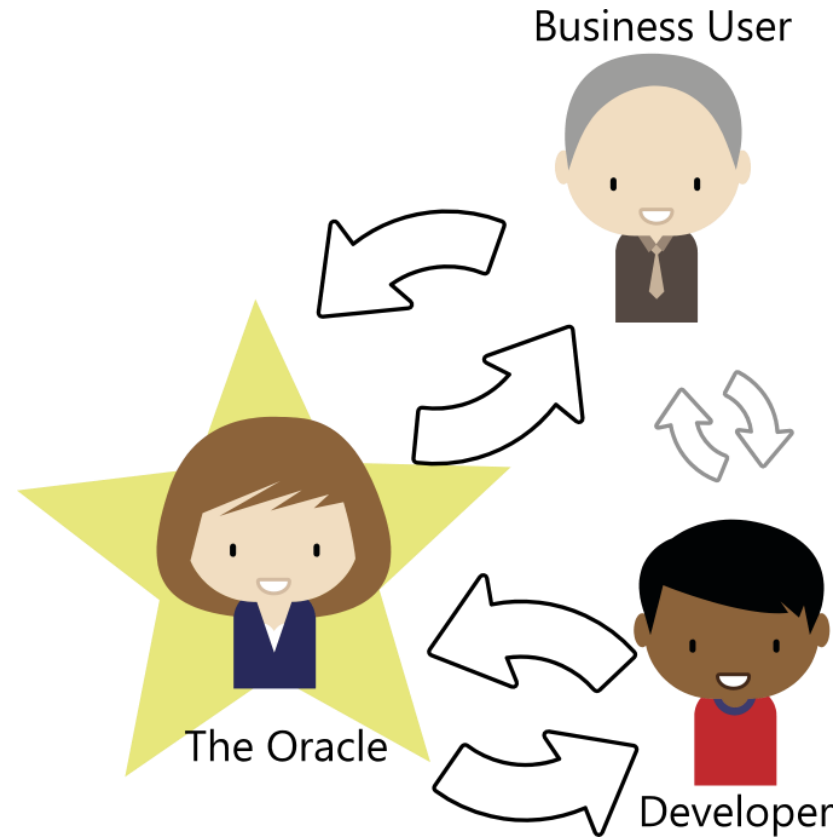
The Oracle



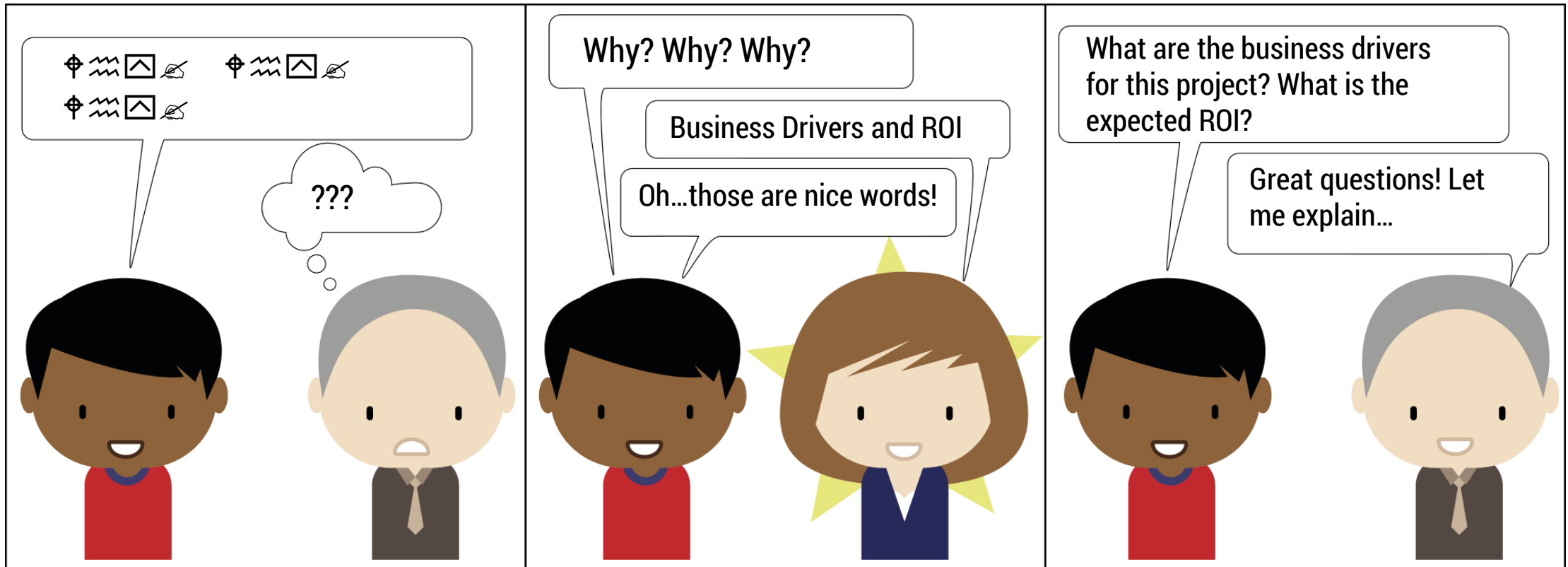
Attributes

- Access to Business Users
- Understanding of Business Process
- Rough understanding of technology
- Wants to discuss how business works and how technology is being applied to solve problems

Oracle, Developer, Business



Learning a new Language

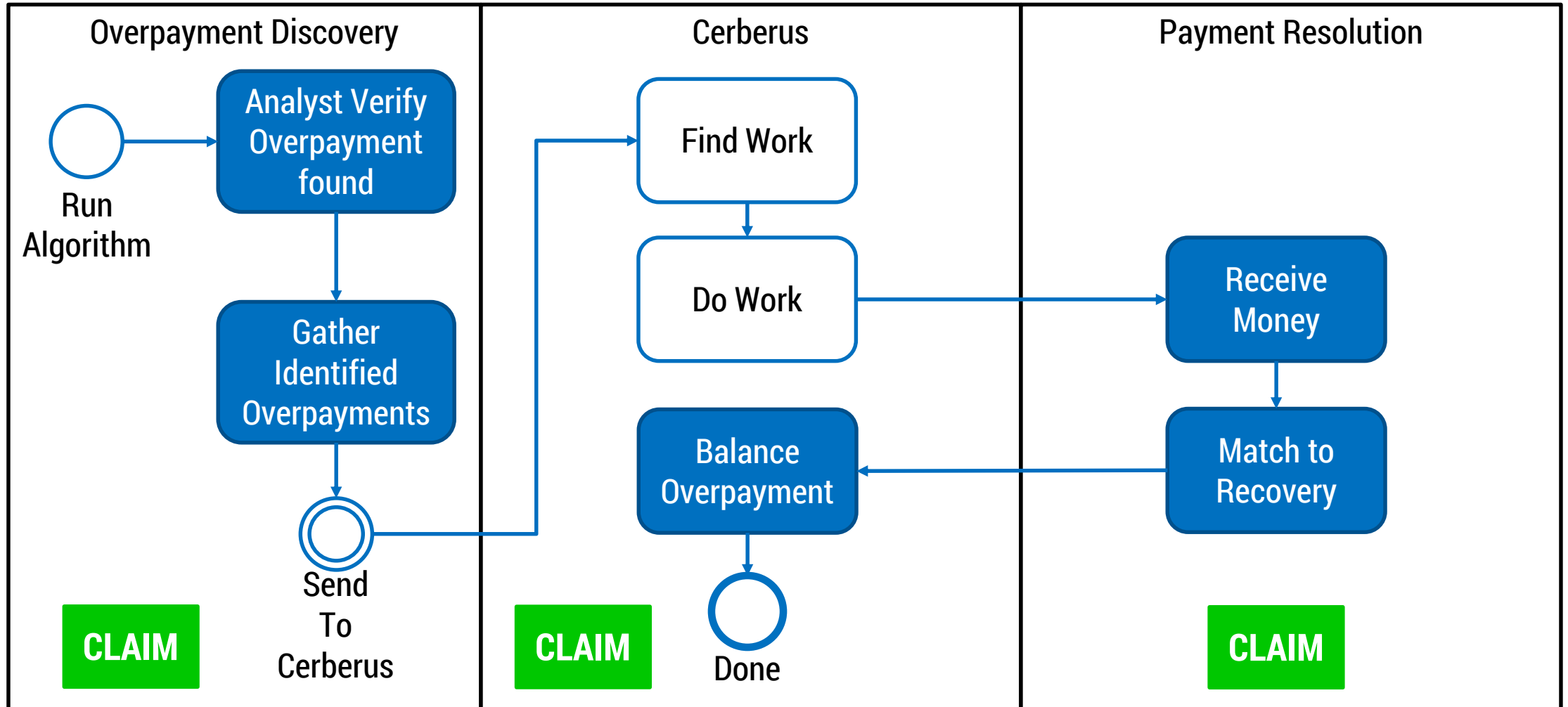


Success



Tim's Mental Model 2

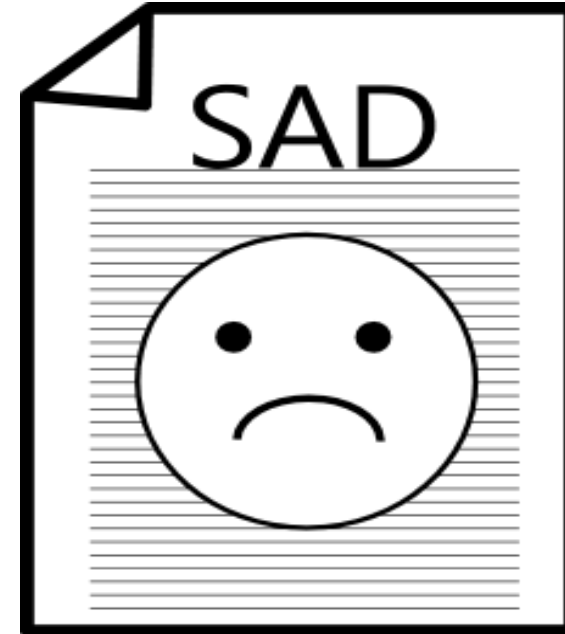
Payment Integrity



Tim the Architect



Solution Architecture Document



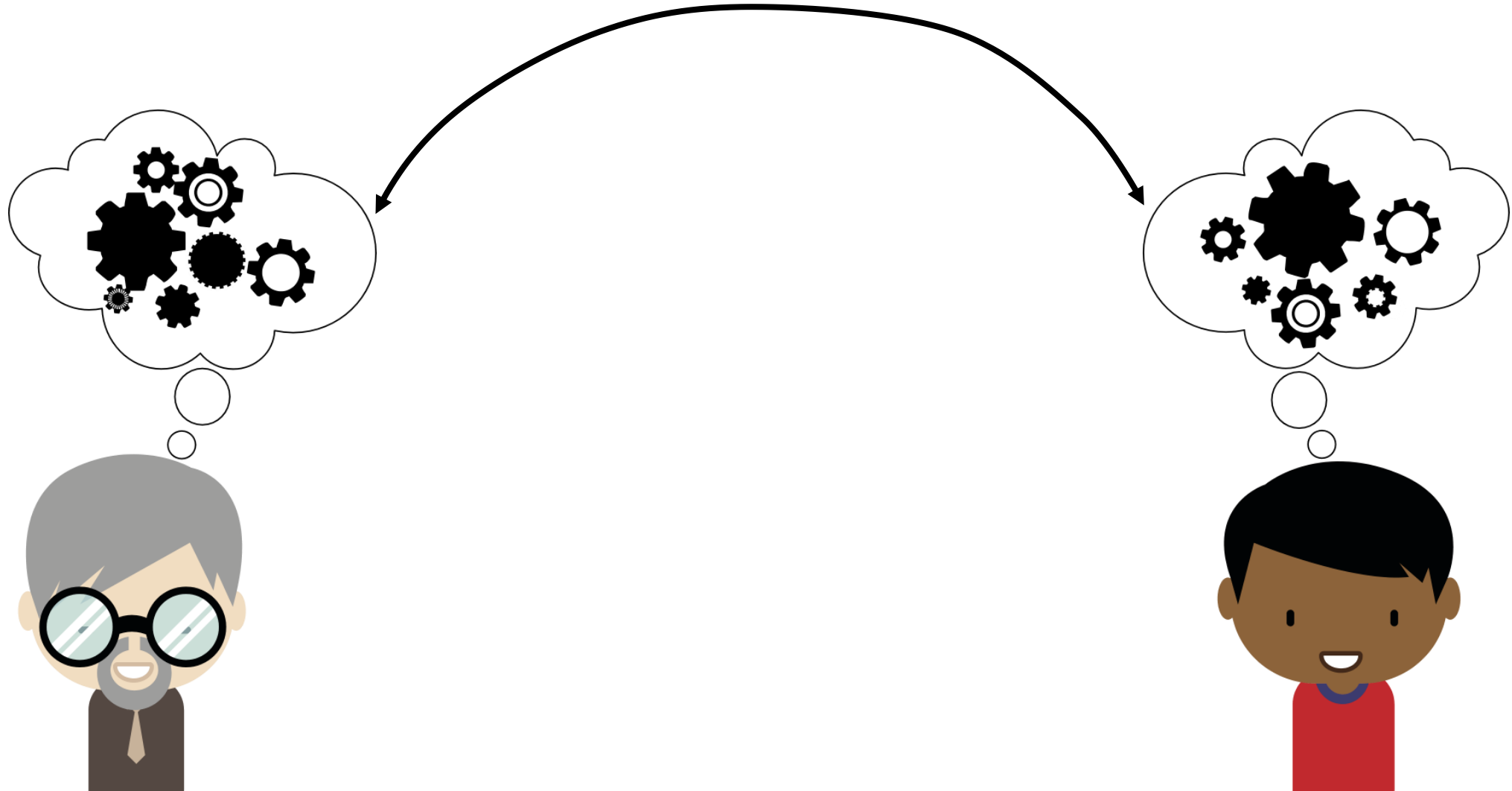
The Guru

Attributes

- Highly technical
- A sounding board for ideas
- Interested in tackling Essential Complexity
- Life long learner

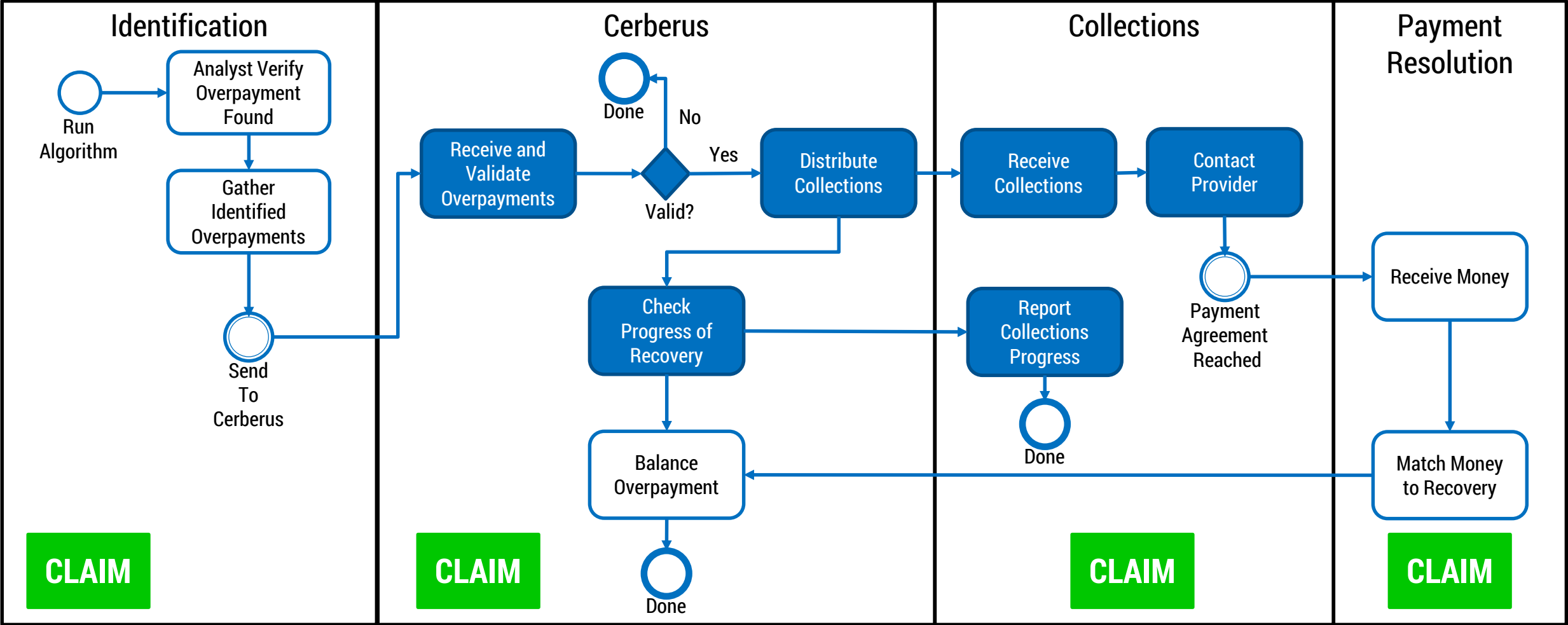


Collaboration

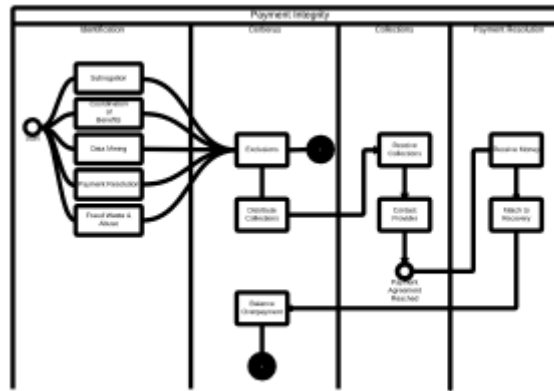
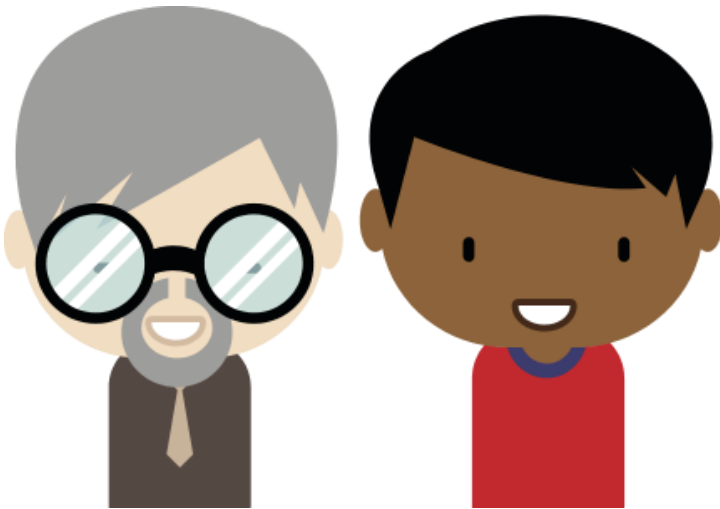


Tim's Mental Model 3

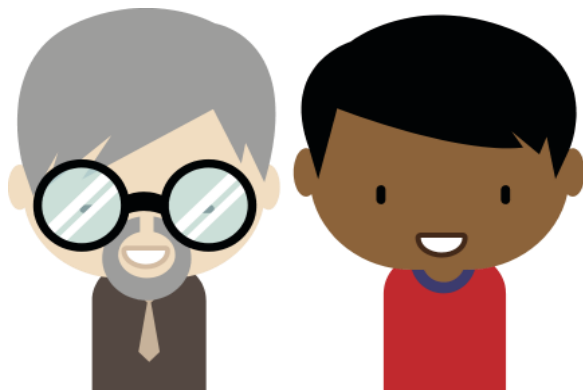
Payment Integrity



Validate Model

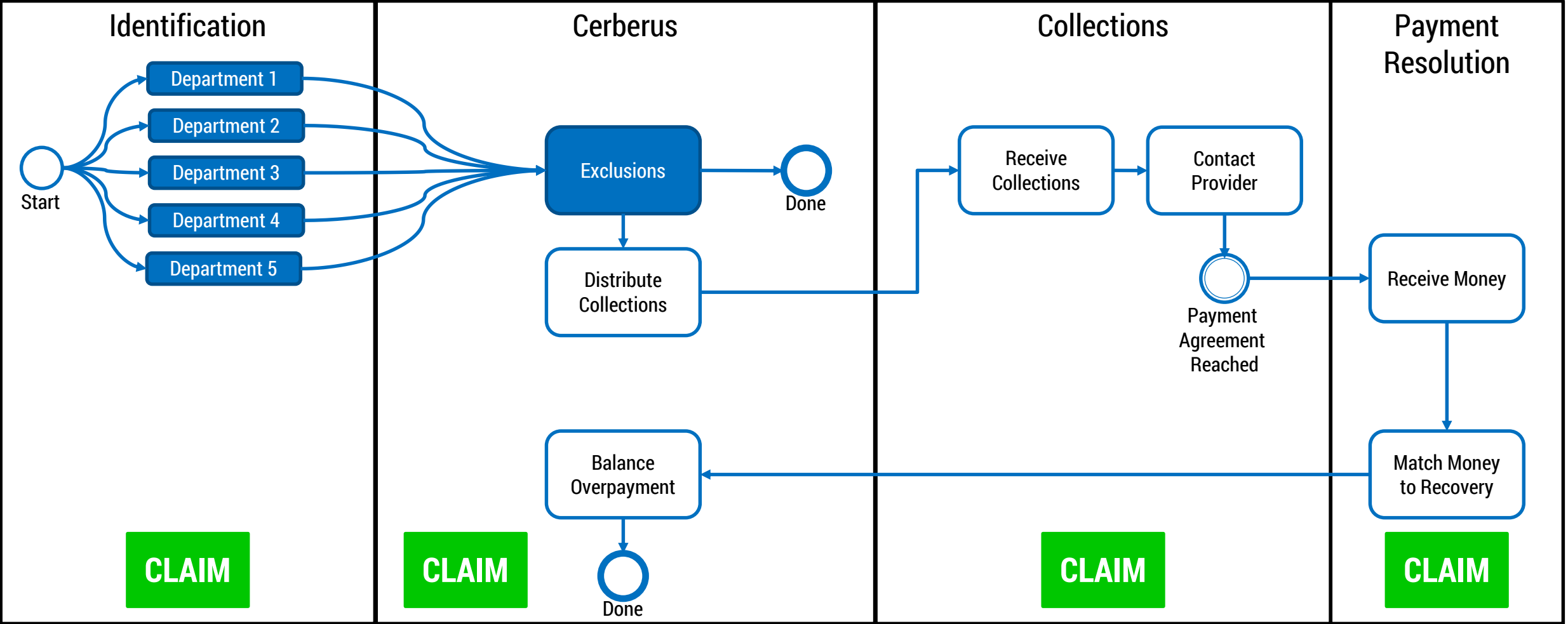


New Integration

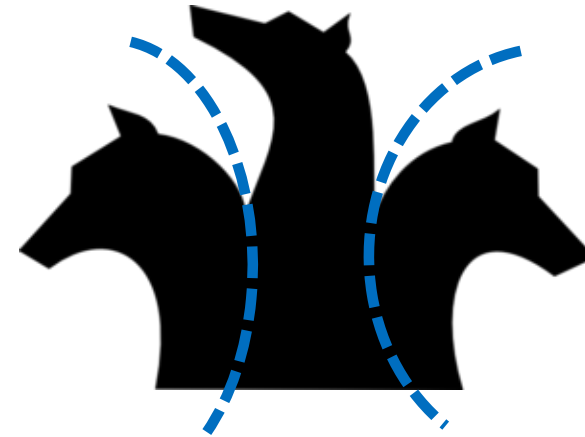
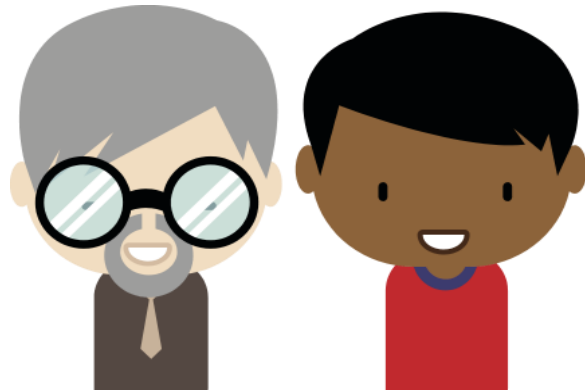


Tim's Mental Model 4

Payment Integrity



Result



Database

Relational Data Model

Claim

ID	Claim#	SSN	Provider	Identifier	Date	Amount	Patient
8	432345	111	Hospital	Subro	1/1/2015	\$100	Will
9	937626	222	Physician	Algo	2/3/2016	\$400	Smith

Identifier

Short	Full Name
Subro	Subrogation
Algo	Algorithm

Financial Line Item

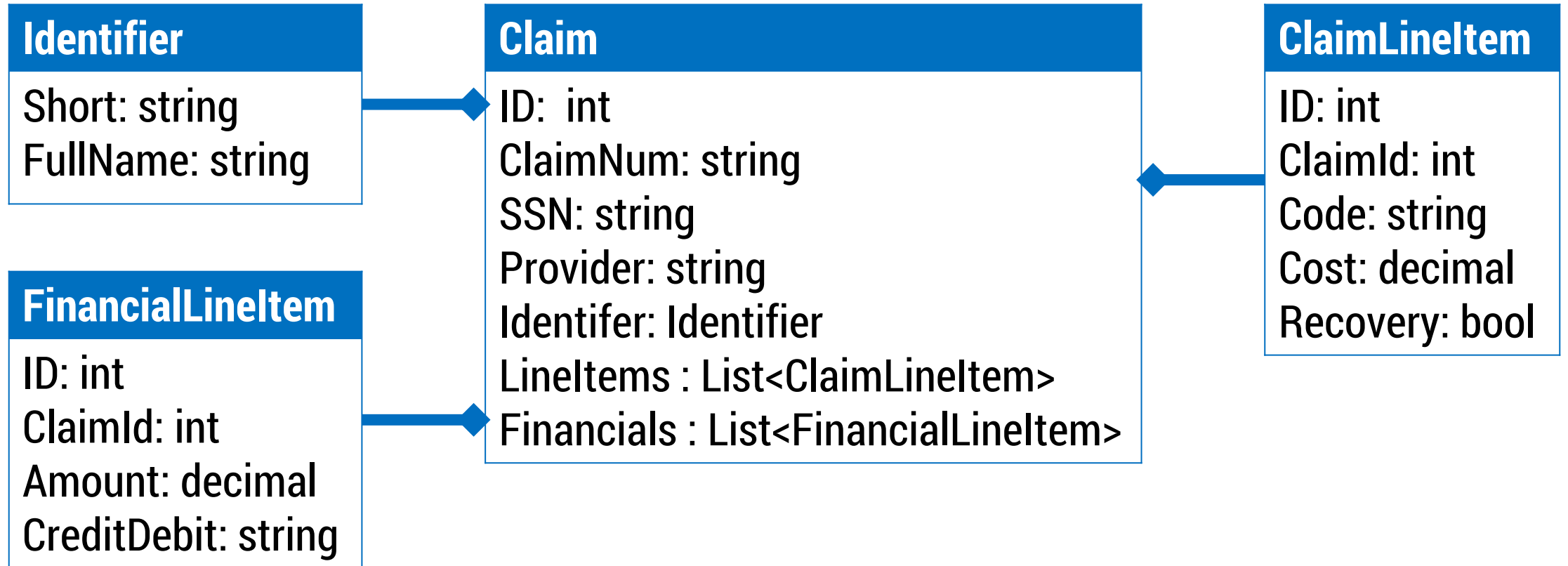
ID	Claim Id	Amount	Credit/Debit
77	8	\$50	Credit
78	9	\$50	Debit

Claim Line Item

ID	Claim Id	Code	Cost	Recovery
322	8	C43.4	\$50	True
323	8	L04.0	\$30	False

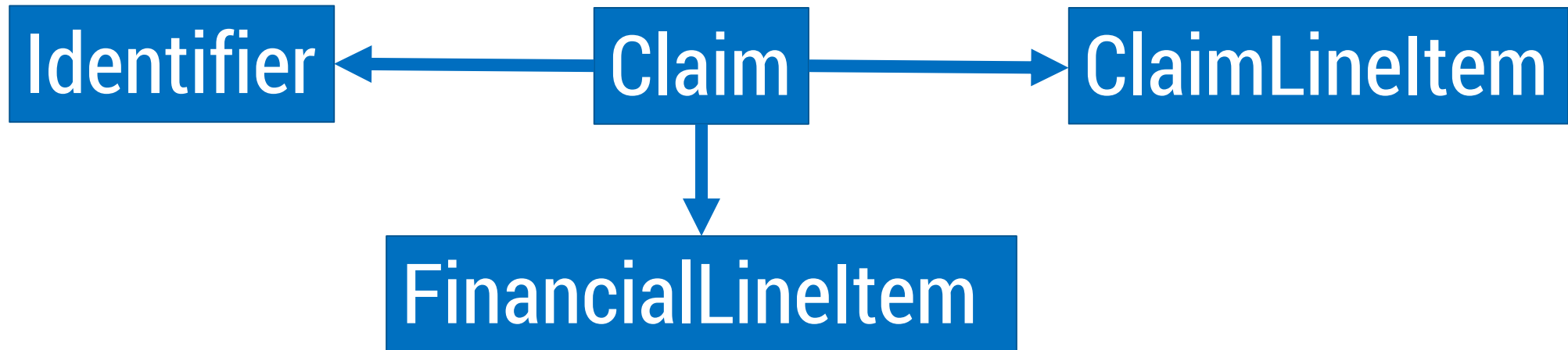
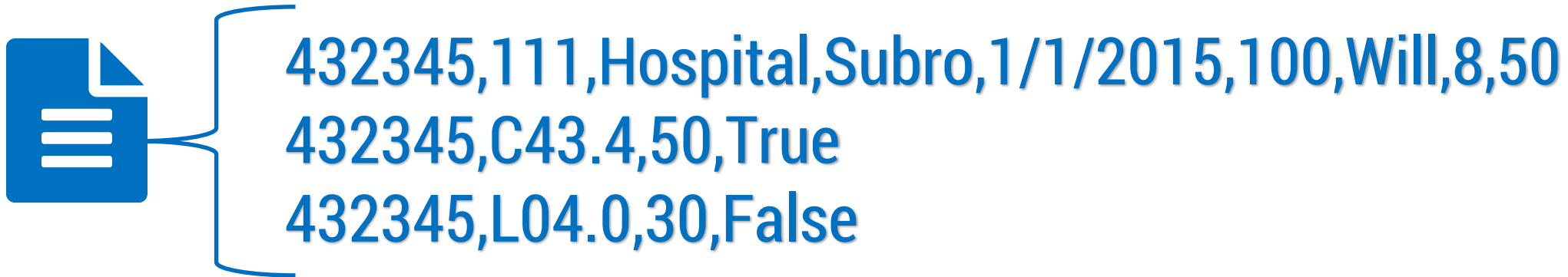
Business Model

Relational Business Model



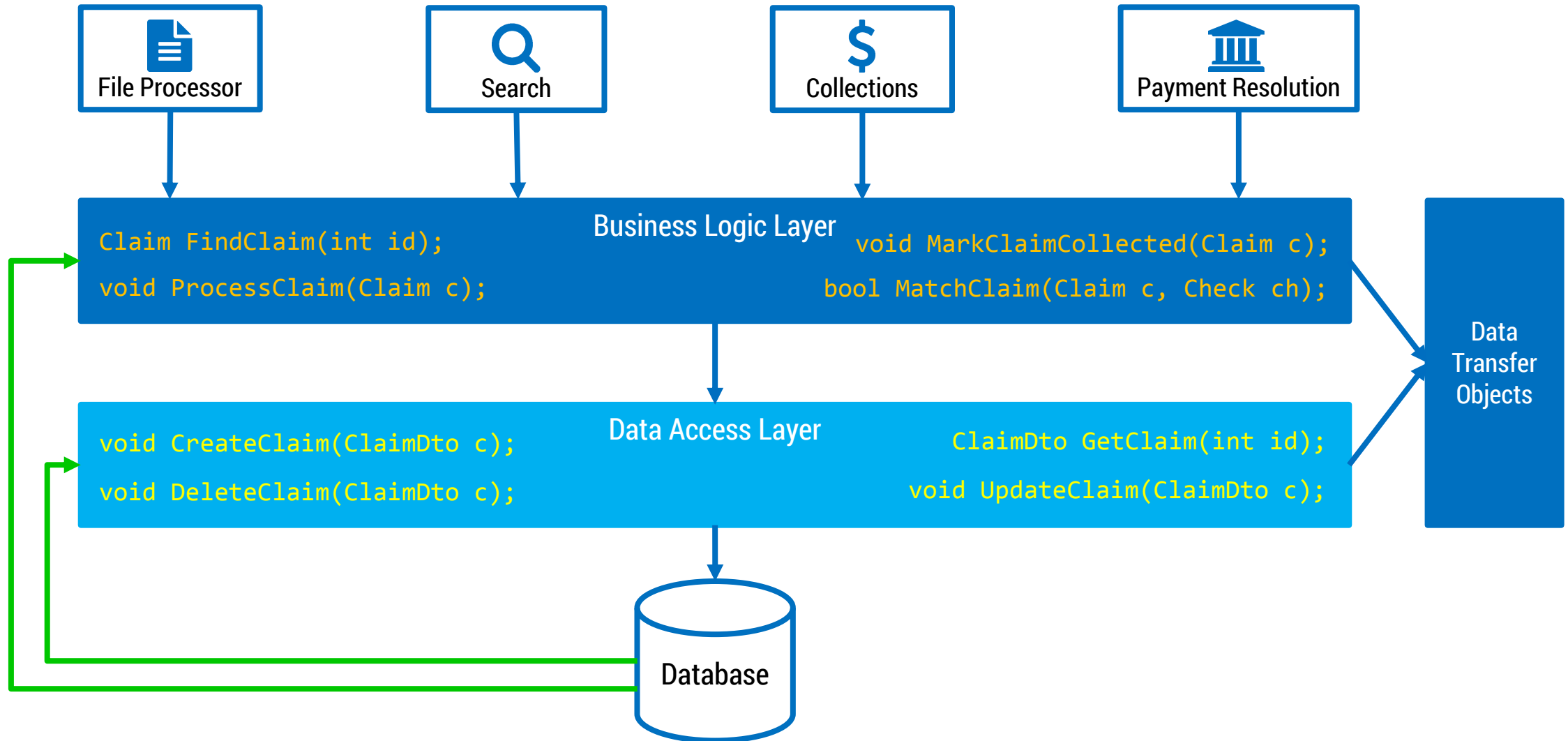
Data Import

Relational Business Model



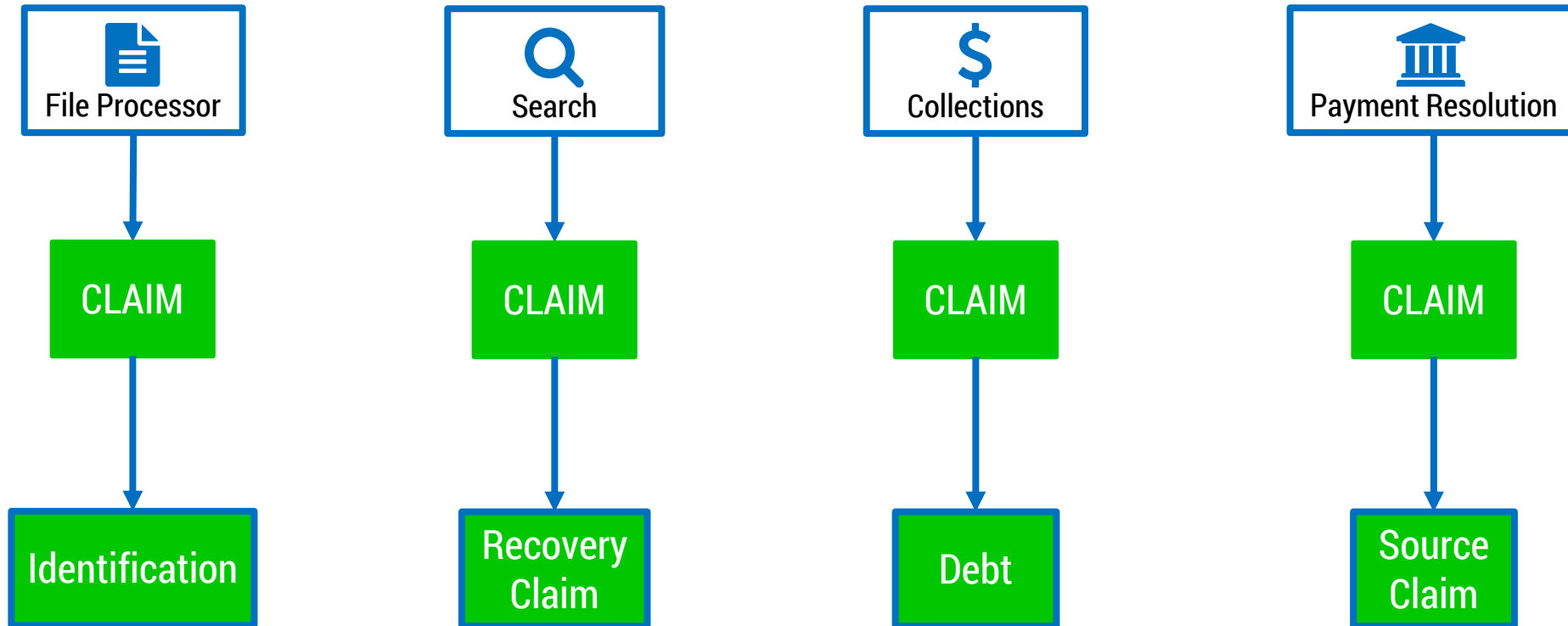
Data Centric Design

Relational Model Propagated



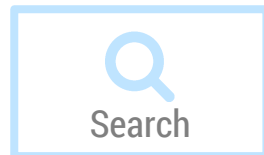
Domain Driven Design

Utilize Bounded Context



DDD Bounded Context

File Processor



Business Logic Layer

```
void ProcessIdentification(Identification idt);
```

Data Access Layer

```
void CreateIdentification(Identification idt);
```

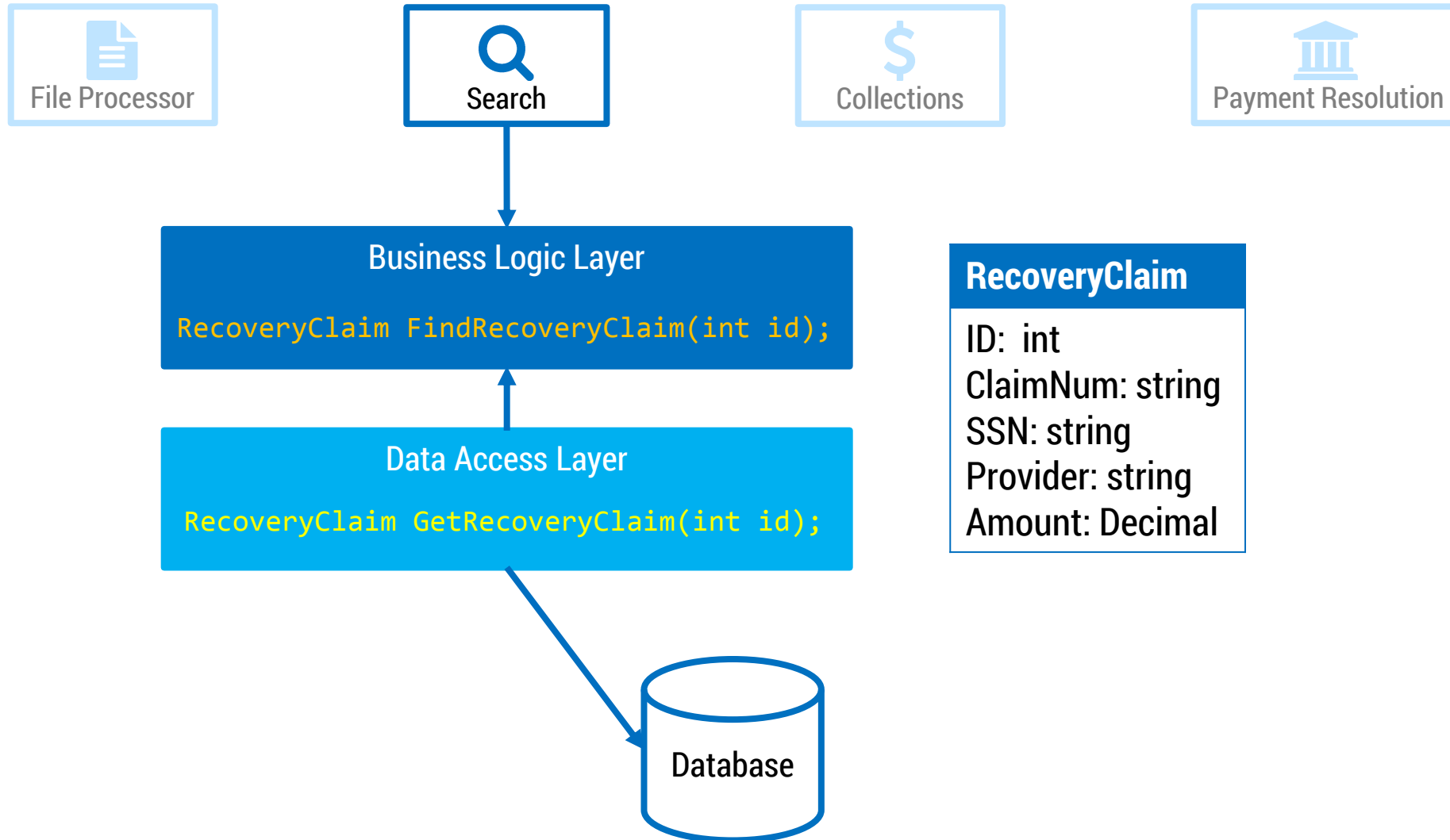
Identification

ID: int
ClaimNum: string
SSN: string
Provider: string
Identifier: Identifier
LineItems : List<ClaimLineItem>
Financials : List<FinancialLineItem>

Database

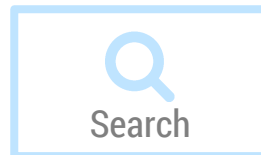
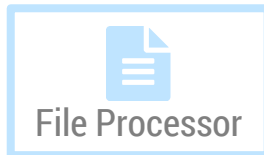
DDD Bounded Context

Search

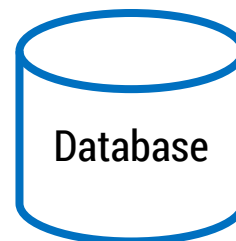
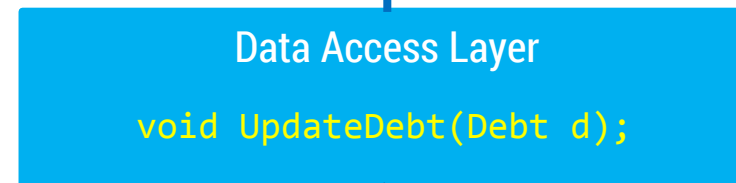
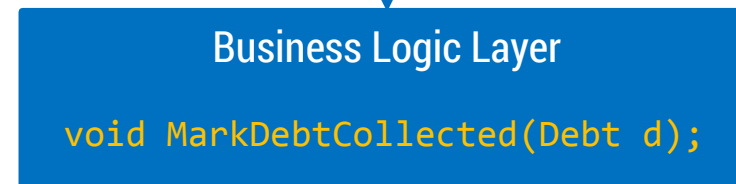


DDD Bounded Context

Collections

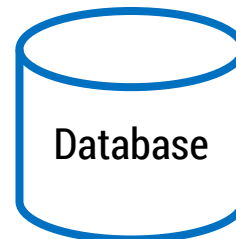
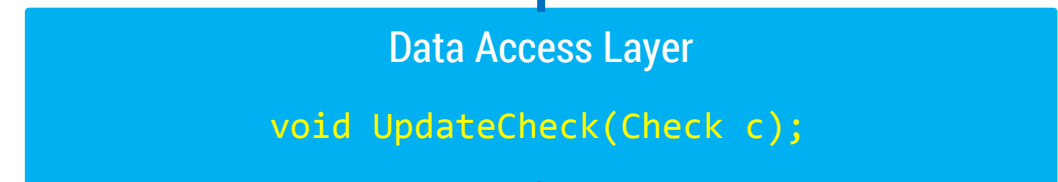
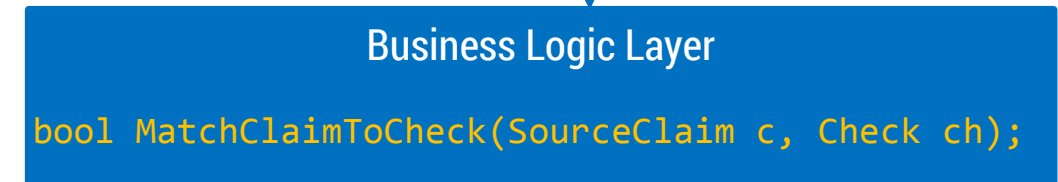
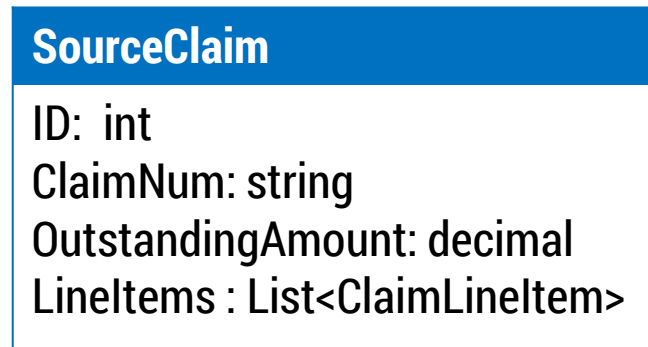
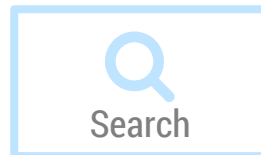
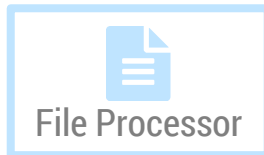


Debt
ID: int
ClaimNum: string
Provider: string
Amount: decimal
LineItems : List<ClaimLineItem>

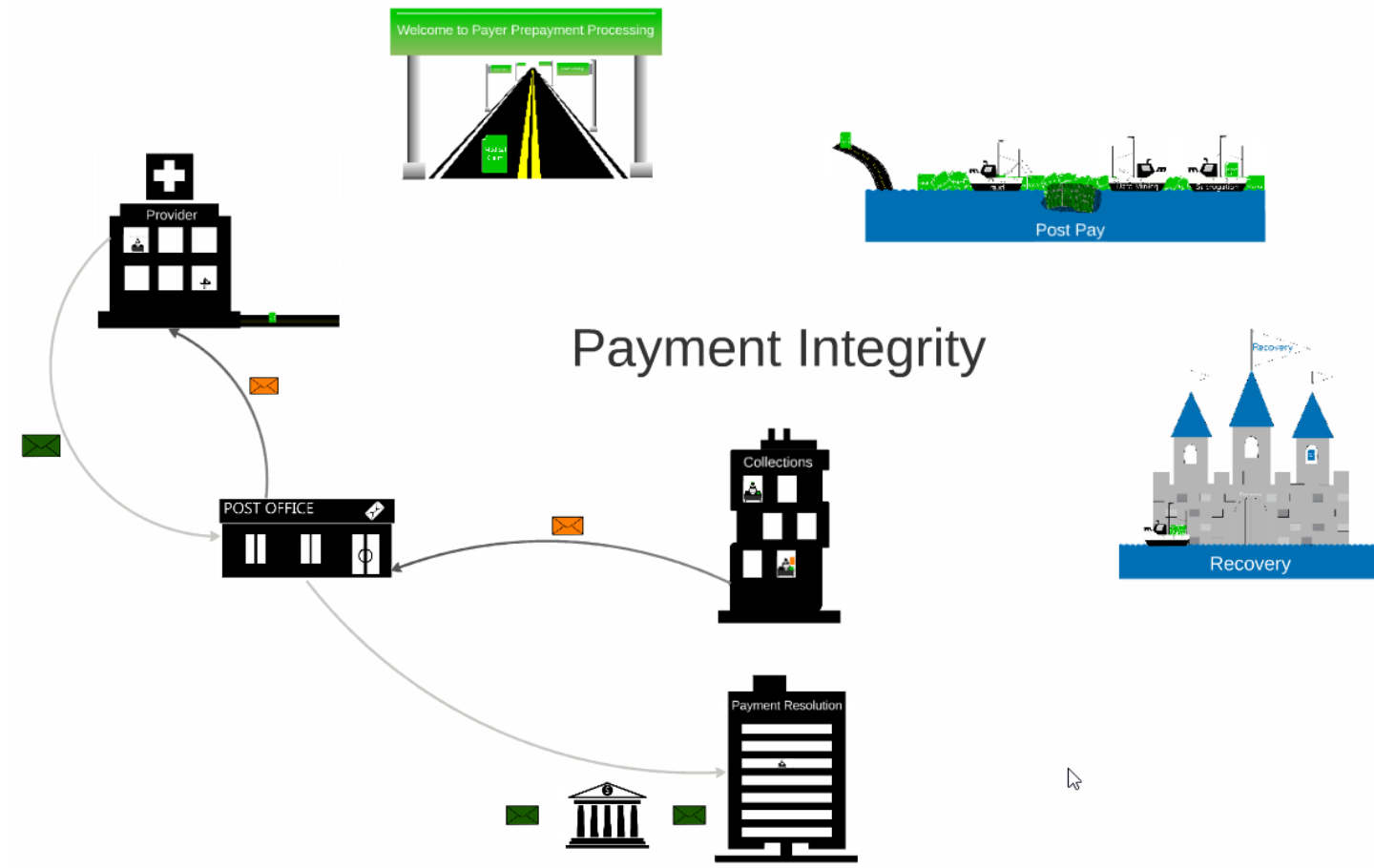


DDD Bounded Context

Payment Resolution



Prezi



What Could Have Been



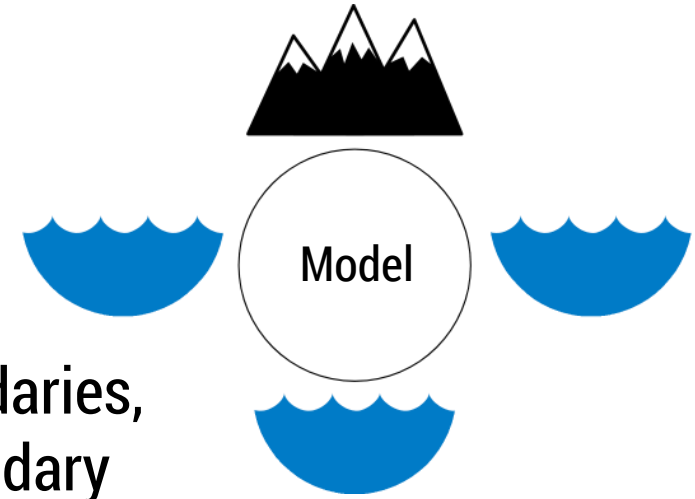
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TAKEAWAYS



Takeaways

Bounded Context

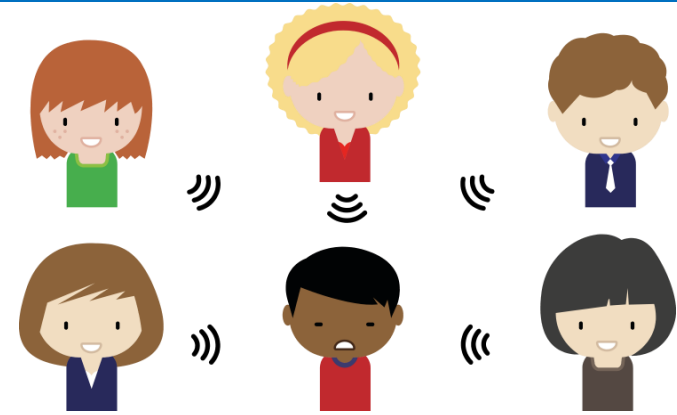


- Bounded Contexts are models with explicit boundaries, where the model is unambiguous within the boundary
- Bounded Contexts are useful in many different architectural styles
- Identifying Bounded Contexts requires significant effort, so focus on your core business
- Many large business applications would derive value from utilizing Bounded Contexts

Takeaways

On Boarding

- Focus on the essential complexity, the domain
- It takes time for humans to digest new information
- A person will not gain deep knowledge without asking questions



Takeaways

The Oracle



- Identify an Oracle and/or business users to help refine the model
- Learn how to shape questions in business terms
- Software design is a collaborative process and requires open communication between business users and developers

Takeaways

The Guru



- Stitch together other peoples' experience to create a larger model
- Identify a Guru to use as a sounding board
- Use relationships with gray beards to establish context of decisions
- Utilize Use Cases to continually validate the model
- Take time to analyze the problem domain

Takeaways

New Integration



- Identify all upstream and downstream business users
- Learn about how the business units who interact with your system are divided and what their responsibilities are

References

- Greg Young CQRS/DDD talks extensively about bounded context
 - <https://youtu.be/KXqrBySgX-s>
- Udi Dahan - CQRS and DDD
 - <https://youtu.be/EkEz3pcLdgY>
- A good discussion of Bounded Context
 - <http://programmers.stackexchange.com/questions/237513/what-in-reference-to-ddd-is-a-bounded-context>
- Eric Evans - Domain Driven Design
 - <http://www.infoq.com/presentations/model-to-work-evans>
- Bounded Context Discussion
 - <http://culttt.com/2014/11/19/bounded-contexts-context-maps-domain-driven-design/>
- Eric Evans - 5 Years after DDD pushed
 - http://dddcommunity.org/library/evans_2009_1/
- Discussion of importance of bounded context
 - <http://eventuallyconsistent.net/2012/05/14/why-bounded-context-really-matters/>
- Definition of Context
 - <http://www.urbandictionary.com/define.php?term=context>
- Bounded Context Definition
 - <http://martinfowler.com/bliki/BoundedContext.html>
- Context and Context Mappings in DDD
 - <http://www.infoq.com/articles/ddd-contextmapping>