GRAPH DATABASES

SAVE YOUR BACON

NEO4J FOR DEV TEAMS

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THE BEGINNING

WHERE YOU WORK

BONZAI BACON

(.COM)

PROJECT:

BACONBIZ 2.0

FEATURES

LONG PROJECT

SCOPE CREEP

FEATURES

UNSTABLE REQUIREMENTS

FEATURES

LOTS OF CODE

LOTS OF BUGS

FEATURES

LOW MORALE

HIGH TURNOVER

BACONBIZ
2.0
NEEDS HELP

THESE ARE NOT NEW PROBLEMS

EVERY DAY PROBLEMS:

- Team members work in isolation
- Information is not shared
- Bugs go undetected
- Fixes are costly

KEVIN'S PROBLEM(S)

KEVIN DOESN'T KNOW THE CODE BASE OR THE TOOLS

KEVIN'S PROBLEM(S)

CHANGES ARE TRICKY

CODE IS FRAGILE

KEVIN'S PROBLEM(S)

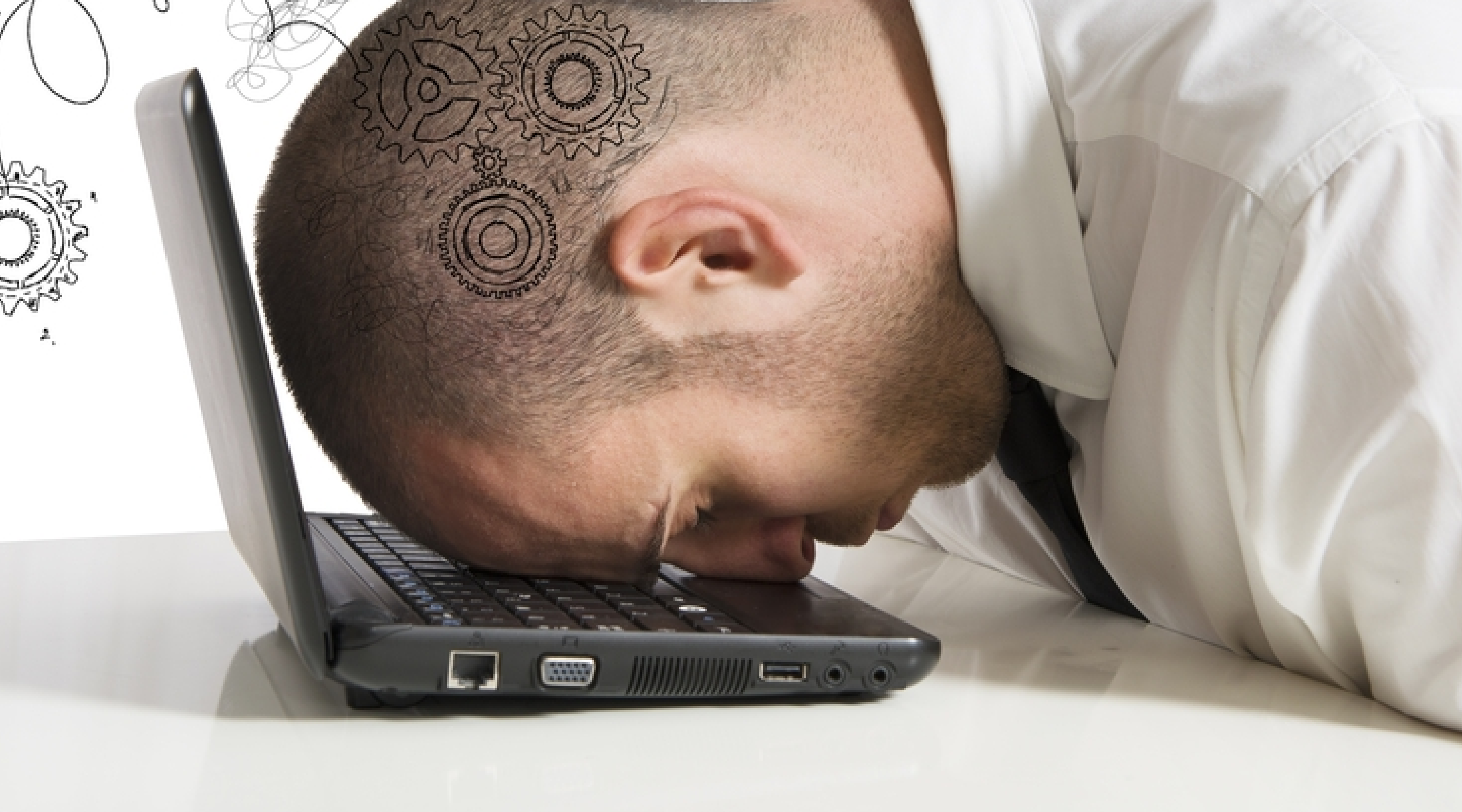
WHERE TO START?

WHEN IS IT DONE?

WHEN IS IT RIGHT?

KEVIN'S RESPONSE...?

STRESSED KEVIN



WHAT IF?

GRAPH DATABASES CAN HELP

INTRO TO GRAPH DATABASES

WHAT'S A GRAPH?

A (directed) graph is a set of nodes connected by edges, where the edges have a direction associated with them.

WHAT'S A GRAPH DATABASE?

a database designed to efficiently store and model items (nodes) and the relationships (edges) between them

WHAT'S DIFFERENT ABOUT A GRAPH DATABASE?

GRAPH VS. RELATIONAL

- Data is stored together naturally
- Most are schema-less by default

EXPRESSIVE QUERIES!

YOUR QUERY LANGUAGE SHOULD

ANSWER YOUR QUESTIONS!

HOW ARE THEY USED?

- Finding connections
- Route calculations
- Recommendation systems

MEET

neo4j

OPEN SOURCE GRAPH DATABASE

BACKGROUND

- Mature (since 2007)
- Significant adoption
- Supported by Neo Technologies, Inc.
- Cloud hosting available

FIRST-CLASS RELATIONSHIPS

- No more many-to-many tables!
- Properties are allowed
- Descriptive labels

WHY NOT USE A SPREADSHEET?

- tab for every type of data
- tab for every kind of relationship
- enjoy creating pivot tables with VLOOKUPs?
- spreadsheets live in *SharePoint*?

AND NOW...

NEO4J BROWSER TOUR

- Browser layout
- Query and Results
- Overview, Favorites, Information
- Queries
- Results

RESULTS

- Visualizations
- Customize color & size
- Auto-complete
- Double-click (dynamic load)
- Real-time styling
- GRASS files

EXPORT

- Image (SVG, PNG)
- Data (CSV, JSON)

TUTORIALS & SAMPLES

- :play start
- :play concepts
- :play query template

TUTORIALS:

:PLAY START

```
// :play start
:play start
```

Try it!

TUTORIALS

:PLAY CONCEPTS

```
// :play concepts
:play concepts
```

Try it!

TUTORIALS

:PLAY QUERY TEMPLATE

```
// :play query template
:play query template
```

Try it!

MEET

CYPHER

YOUR NEW QUERY LANGUAGE

CREATING DATA

CREATE KEVIN

```
// Create Kevin
MERGE (kevin:Person { name: "Kevin" })
RETURN kevin;
```

Try it!

PATTERN MATCHING

MATCH (n)

where **(n)** is a pattern

MATCH EXAMPLE

FIND KEVIN!

```
// Find Kevin!
MATCH (kevin:Person { name: "Kevin" })
RETURN kevin;
```

Try it!

SHOW ME EVERYTHING!

GET EVERYTHING

```
// Get everything
MATCH n
OPTIONAL MATCH (n)-[r]-()
RETURN n, r;
```

Try it!

DON'T FORGET A LIMIT

USE LIMITS

```
// Use limits
MATCH (n)
OPTIONAL MATCH (n)-[r]-()
RETURN n, r
LIMIT 25;
```

Try it!

"ARROW" SYNTAX

Direction	`(a)-->(b)`
Hops	`(a)-[*1..2]->(b)`
Label	`(a)-[:KNOWS]->(b)`

WHICH DIRECTION?

(a)-->(b)

...OR...

(a)<--(b)

HOW MANY HOPS?

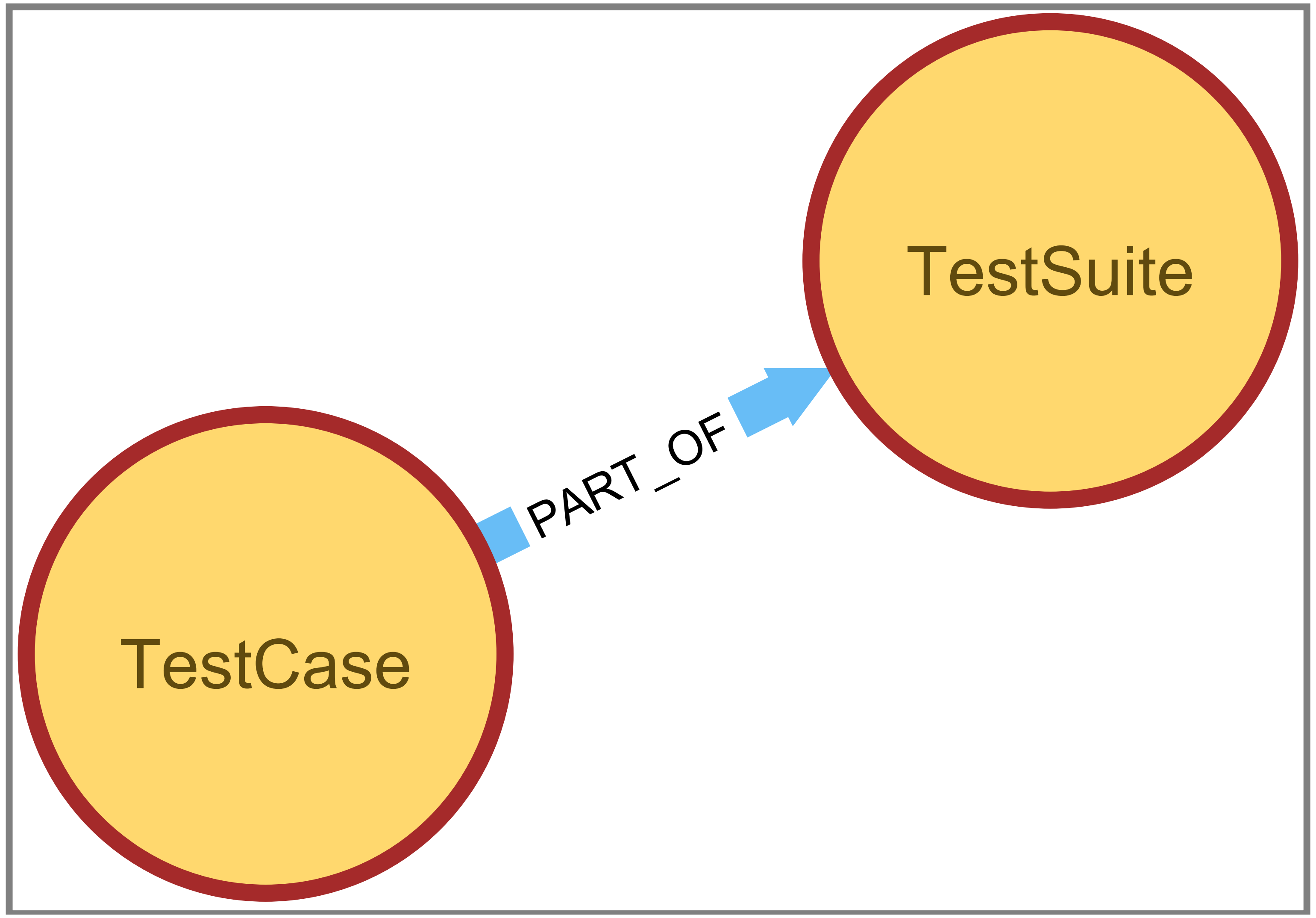
```
(a)-[*1..2]->(b)
```

WHAT KIND?

```
(a)-[:KNOWS]->(b)
```

:KNOWS IS A *LABEL*

EXAMPLE



MERGE AND SET

DESCRIBE KEVIN

```
// Describe Kevin
MERGE (kevin:Person { name: "Kevin" })
ON CREATE SET specialty = "CSS baby!"
RETURN kevin;
```

Try it!

HOW DOES THAT HELP MY TEAM?

REMEMBER KEVIN?

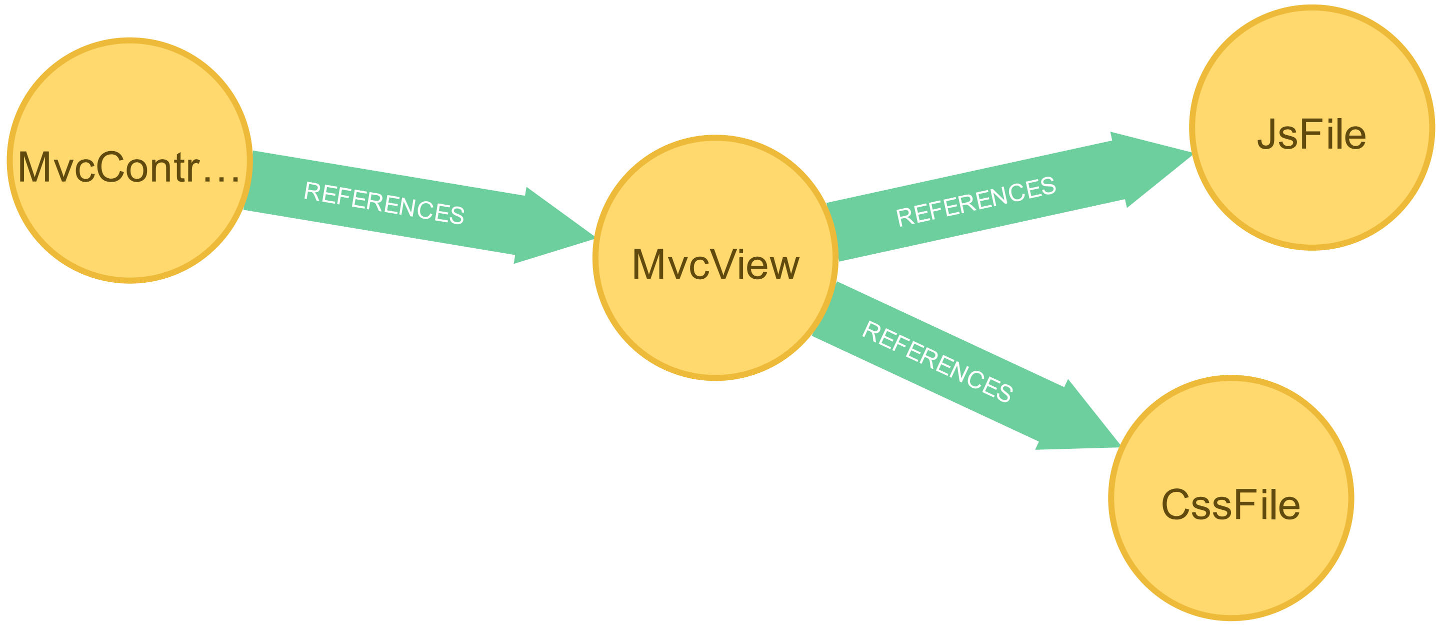
WHY'S IT SO HARD?

- Manual preparation
- Too much work
- Email review
- Queries in work tracking tools

TOOL LIMITS

- Query languages: SQL
- Excel filtering and sorting

WE CAN GIVE HIM A MAP



GRAPH STRATEGIES

FOR

SOFTWARE SUCCESS

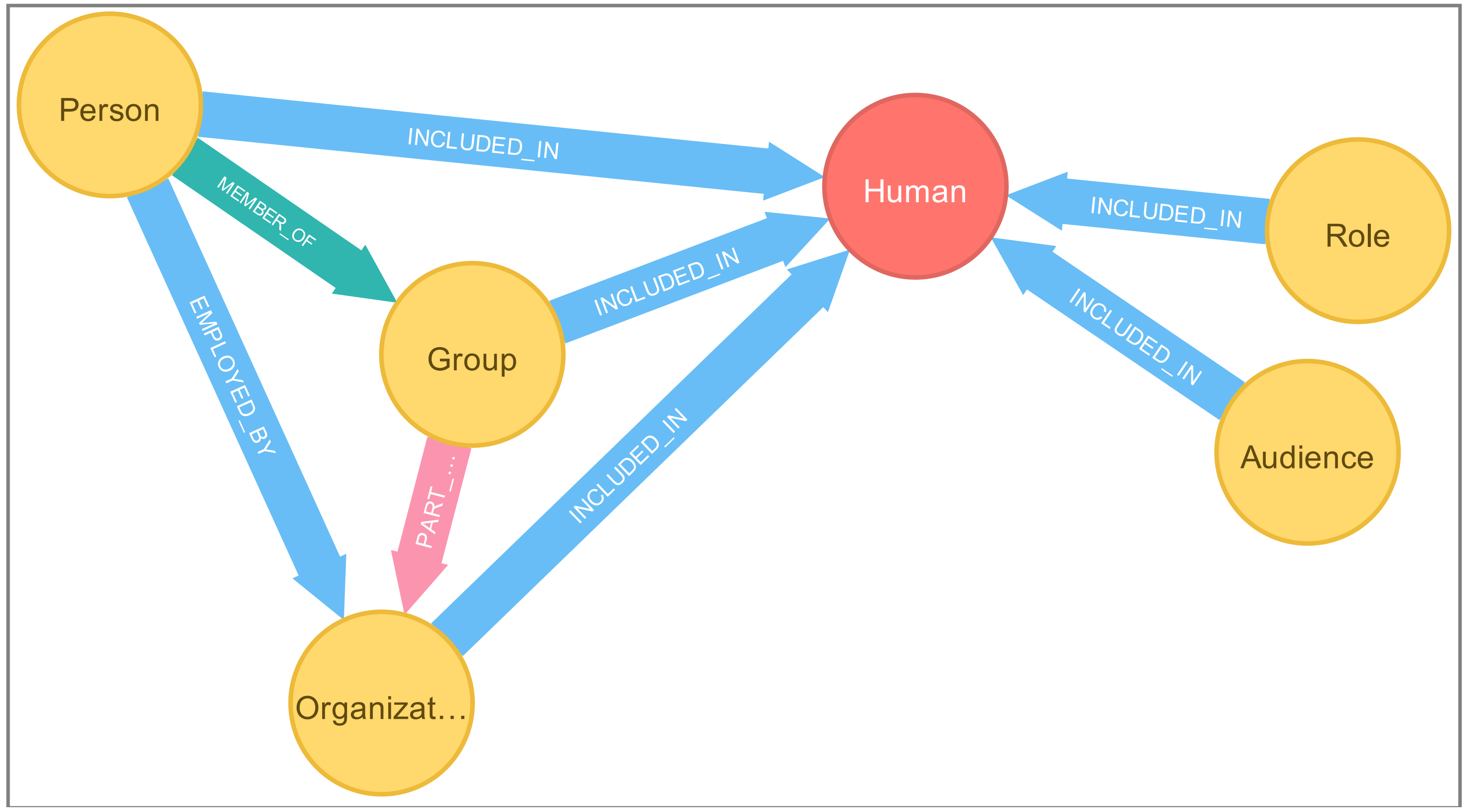
STRATEGY #1:

MODEL

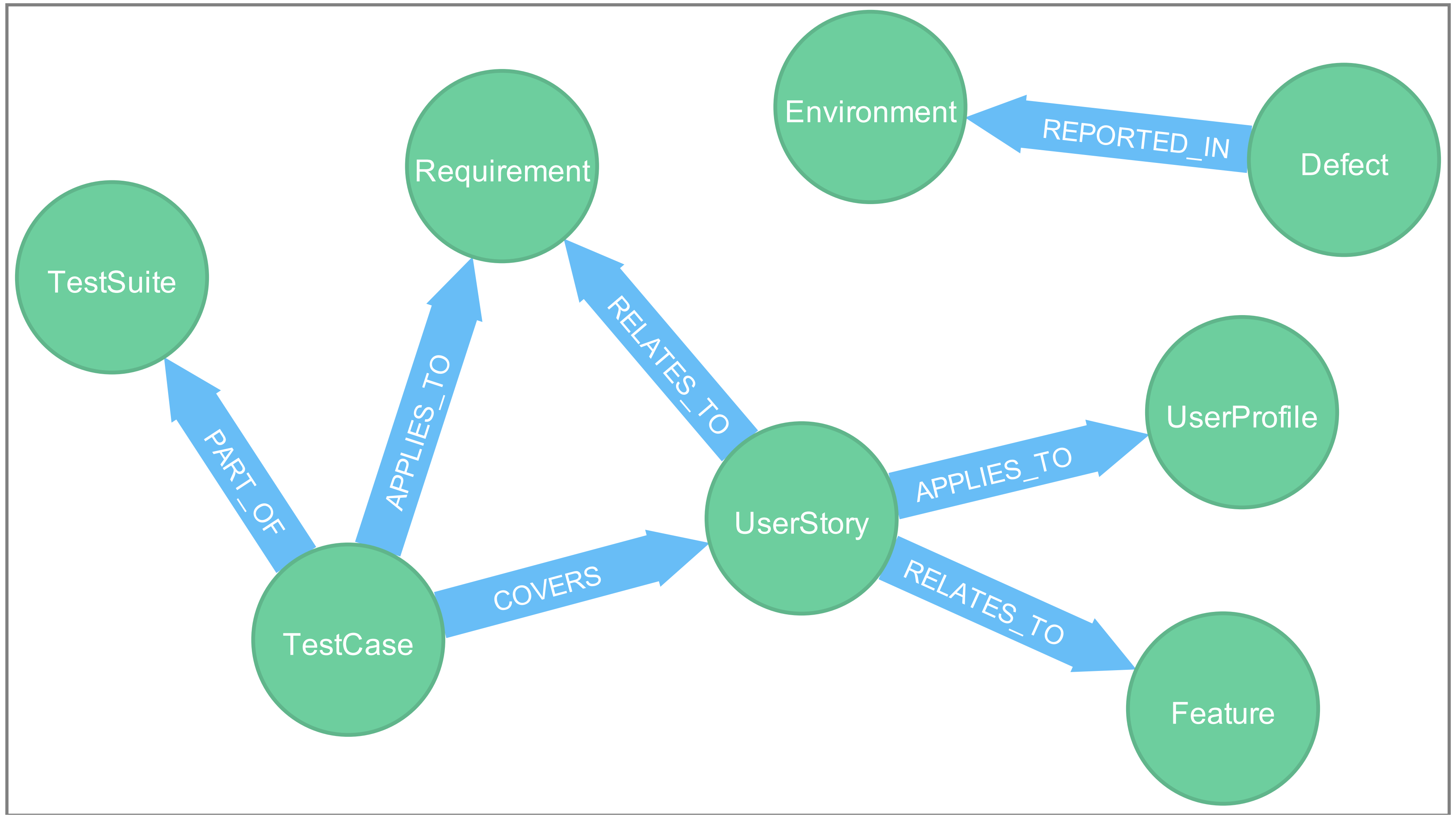
WHAT YOU WANT TO

MASTER

HUMAN DOMAIN

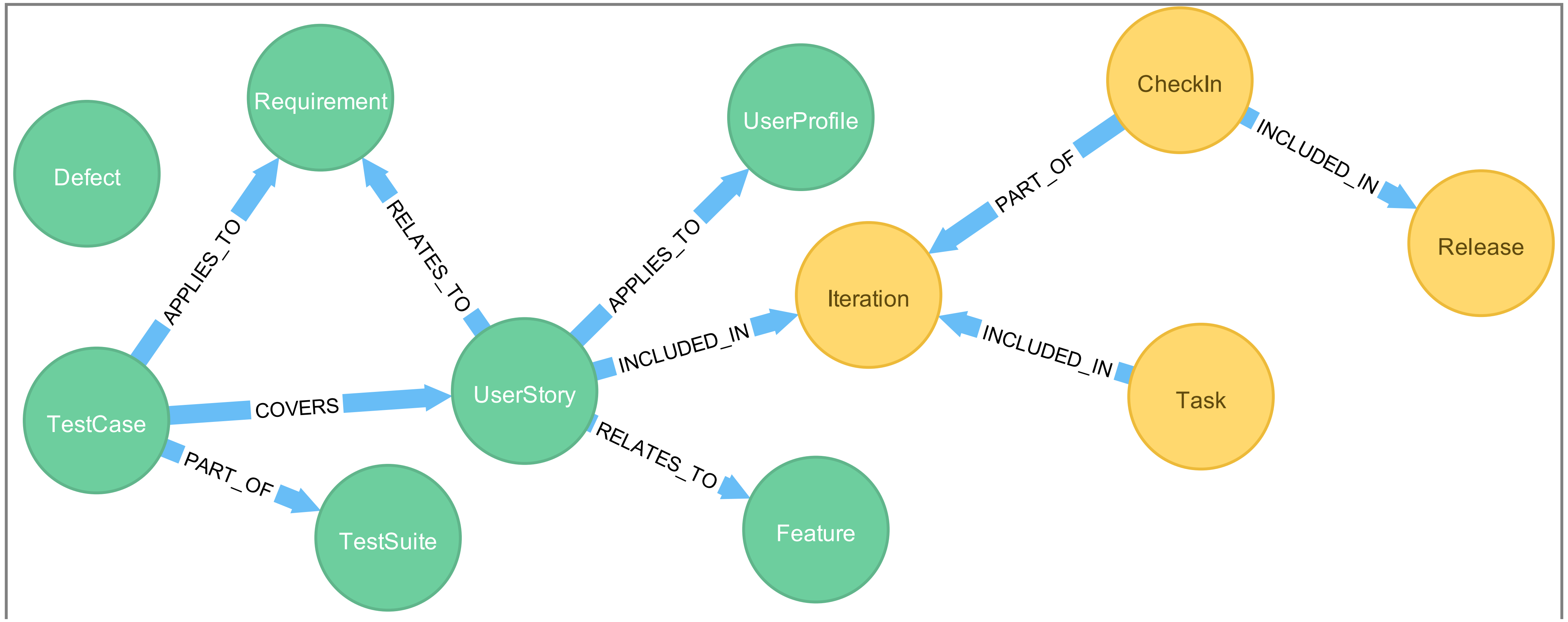


TESTING DOMAIN



DOMAINS CAN OVERLAP

PROCESS DOMAIN (W/ TESTING)



STRATEGY #2:

CONNECT

WHAT YOU WANT TO

CONTROL

MAKE CONNECTIONS

USE HIGH-LEVEL CONCEPTS

- Releases
- Features
- Areas

GET FEATURES

```
// Get features
MATCH (feature:Feature)
RETURN feature;
```

Try it!

STRATEGY #3:

CONTRIBUTE

WHAT YOU WANT TO

CREATE

MINE YOUR DATA

STEPS TO BUILD YOUR MODEL

WHO HAS IT?

DBAs	Tables, procs & queries
QAs	Test cases
Devs	Code
BAs	Requirements docs

DEVS:

COMB YOUR CODE BASE!

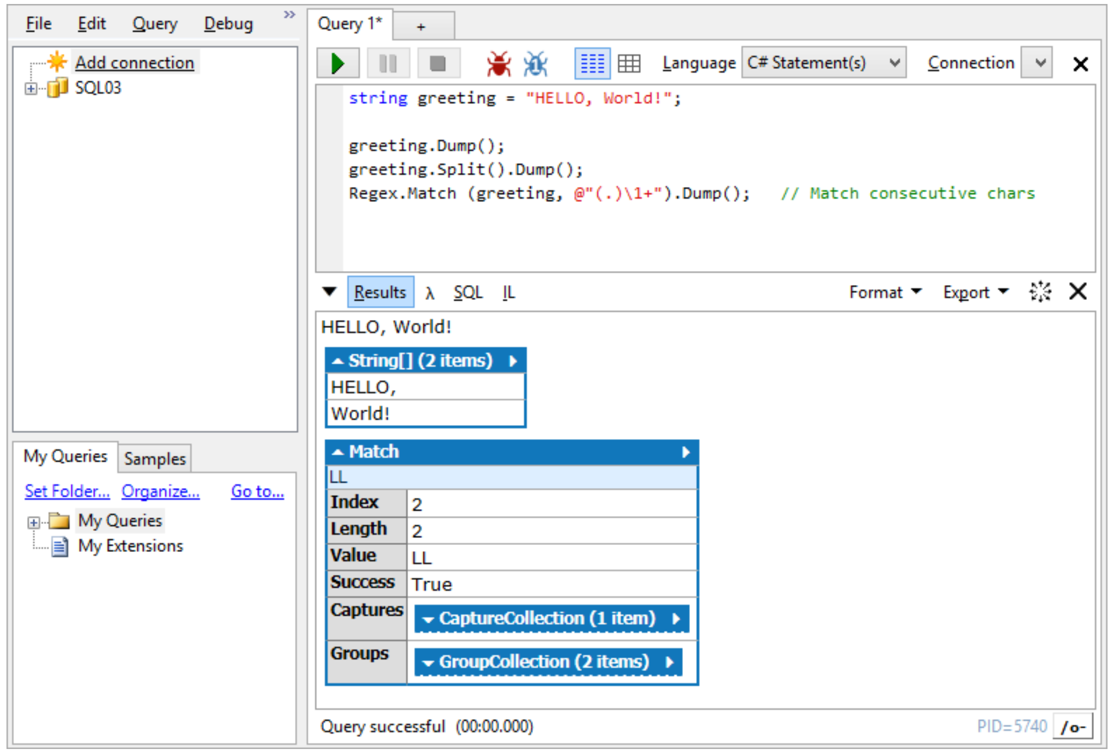
- Style sheets
- JavaScript files
- MVC views
- Business objects

USE YOUR TOOLS

THINGS YOU ALREADY KNOW

- SQL (information_schema.* views)
- Find in Files (Regex included)
- Command-line (dir *.css /s /a /b)
- And...

LINQPAD



```
string greeting = "HELLO, World!";

greeting.Dump();
greeting.Split().Dump();
Regex.Match (greeting, @"(.)\1+").Dump();    // Match consecutive chars
```

```
HELLO, World!
▲ String[] (2 items) ▶
HELLO,
World!
▲ Match ▶
LL
Index     2
Length    2
Value     LL
Success   True
Captures  ▼ CaptureCollection (1 item) ▶
Groups    ▼ GroupCollection (2 items) ▶
```

Query successful (00:00.000)   PID=5740 /o-

LINQPAD.NET

WHICH IS EASIER?

COMBING THROUGH *LOTS* OF HTML…?

```
<html>…
<link rel="stylesheet" href="some-styles.css" />
<!-- … or in ASP.NET MVC… -->
<link rel="stylesheet" href='@Url.Content("~/Sty
les/some-styles.css")' />
…<html>
```

OR THIS?

MATCH CSS FILES WITH MVC VIEWS

```
// MATCH CSS files with MVC views
MATCH (c:CssFile)-[r]-(v:MvcView)
RETURN DISTINCT c, v
```

Try it!

CSV LOAD WEB CODE ITEMS

```
// CSV Load Web code items
LOAD CSV WITH HEADERS FROM
"http://localhost/SaveYourBacon/import/NewCssFiles.txt" AS csvLine
FIELDTERMINATOR '\t'
MERGE (css:CssFile { name: csvLine.CssFile })
MERGE (view:MvcView { name: csvLine.MvcView })
MERGE (view)-[:USES]->(css)
RETURN DISTINCT view, css;
```

Try it!

GET CSS FILES

```
// Get CSS files
MATCH (n:CssFile) RETURN n;
```

Try it!

CSS TO MVC VIEW?

```
// CSS to MVC View?
MATCH (css:CssFile)-[]-(vw:MvcView)
RETURN css, vw;
```

Try it!

CSS TO MVC VIEW, MAYBE MVC CONTROLLERS?

```
// CSS to MVC View, maybe MVC Controllers?
MATCH (css:CssFile)-[]-(vw:MvcView)
OPTIONAL MATCH (vw)-[]-(ctl:MvcController)
RETURN css, vw, ctl;
```

Try it!

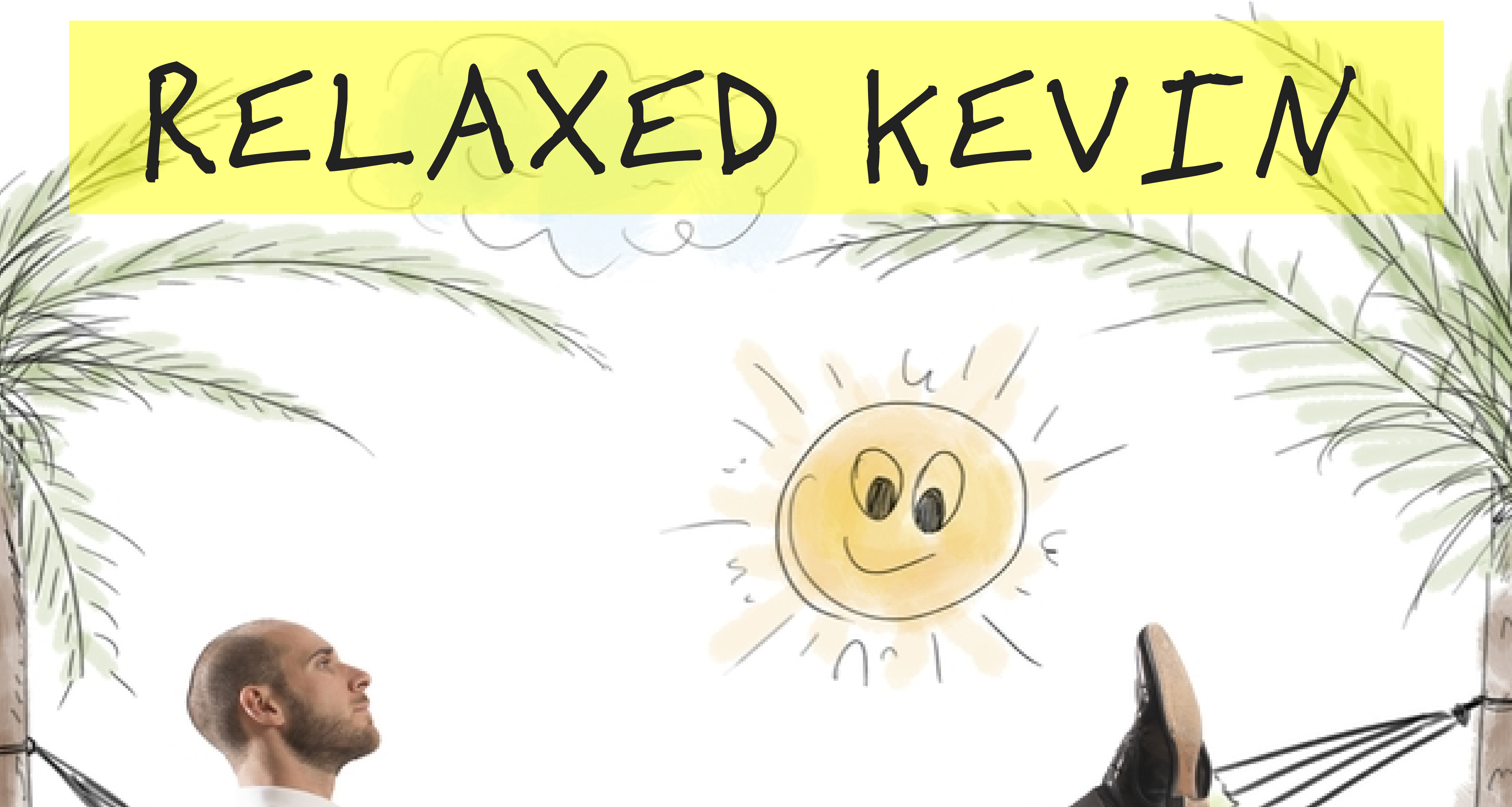
DEVS WIN!

PREDICT IMPACTS

LESS REWORK

MORE FEATURES

RELAXED KEVIN



KEVIN CHECKS IN HIS CHANGES

```
// Kevin checks in his changes
MATCH (kevin:Person { name: "Kevin" })
MATCH (global_css:CssFile { name: "Global.css" }
)
MATCH (details_css:CssFile { name: "ProductDetai
ls.css" })
MERGE (checkin:CheckIn { name: "Change set 2231"
,
description : "CSS fixes for product details" })
MERGE (global_css)-[:INCLUDED_IN]->(checkin)
MERGE (details_css)-[:INCLUDED_IN]->(checkin)
MERGE (kevin)-[:SUBMITTED { submitDate : "2015-0
MERGE (kevin)-[:SUBMITTED { submitDate: "2019-0
6-13" }]->(checkin)
RETURN kevin, global_css, details_css, checkin;
```

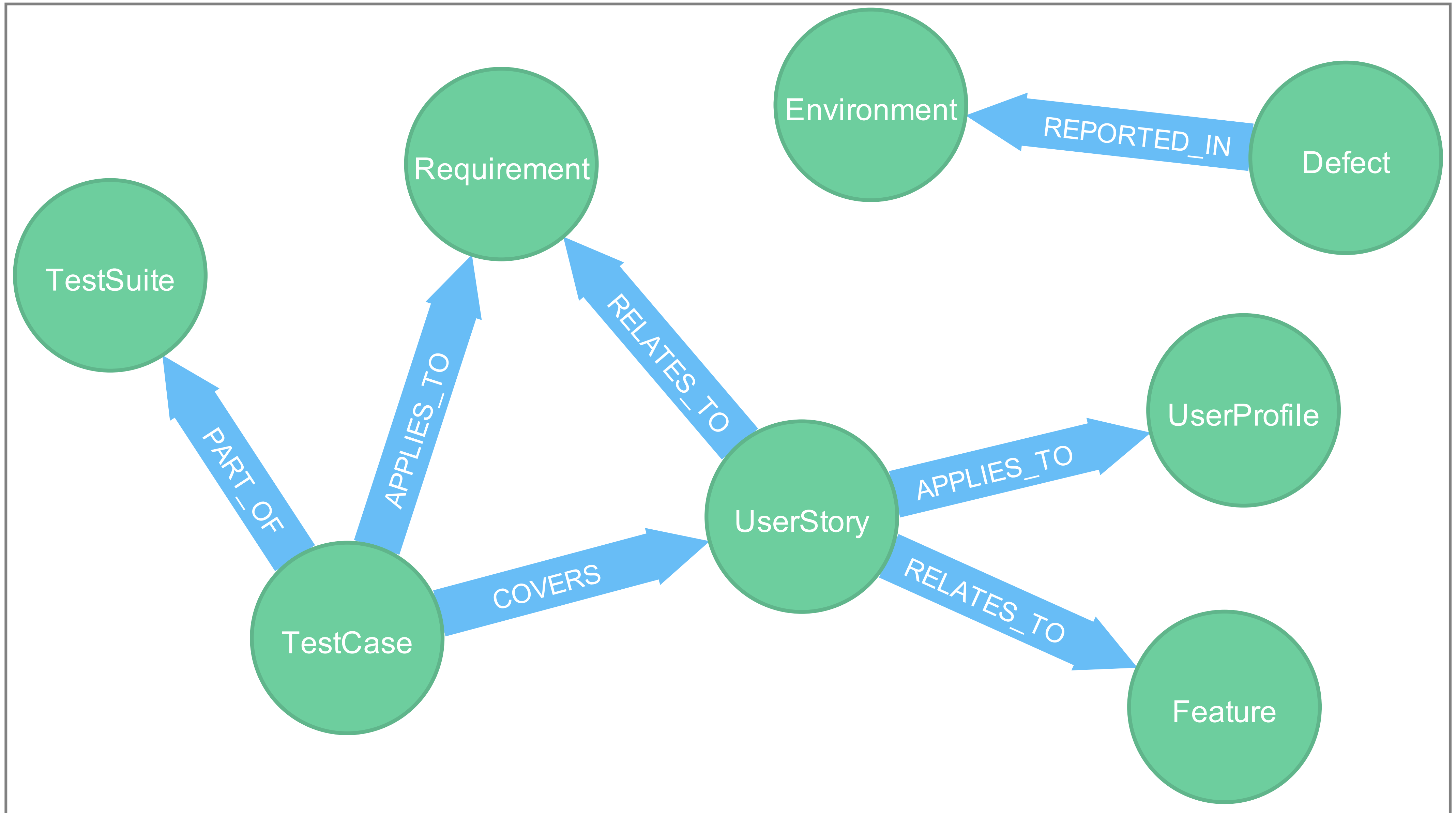
Try it!

BUSINESS ANALYSTS:

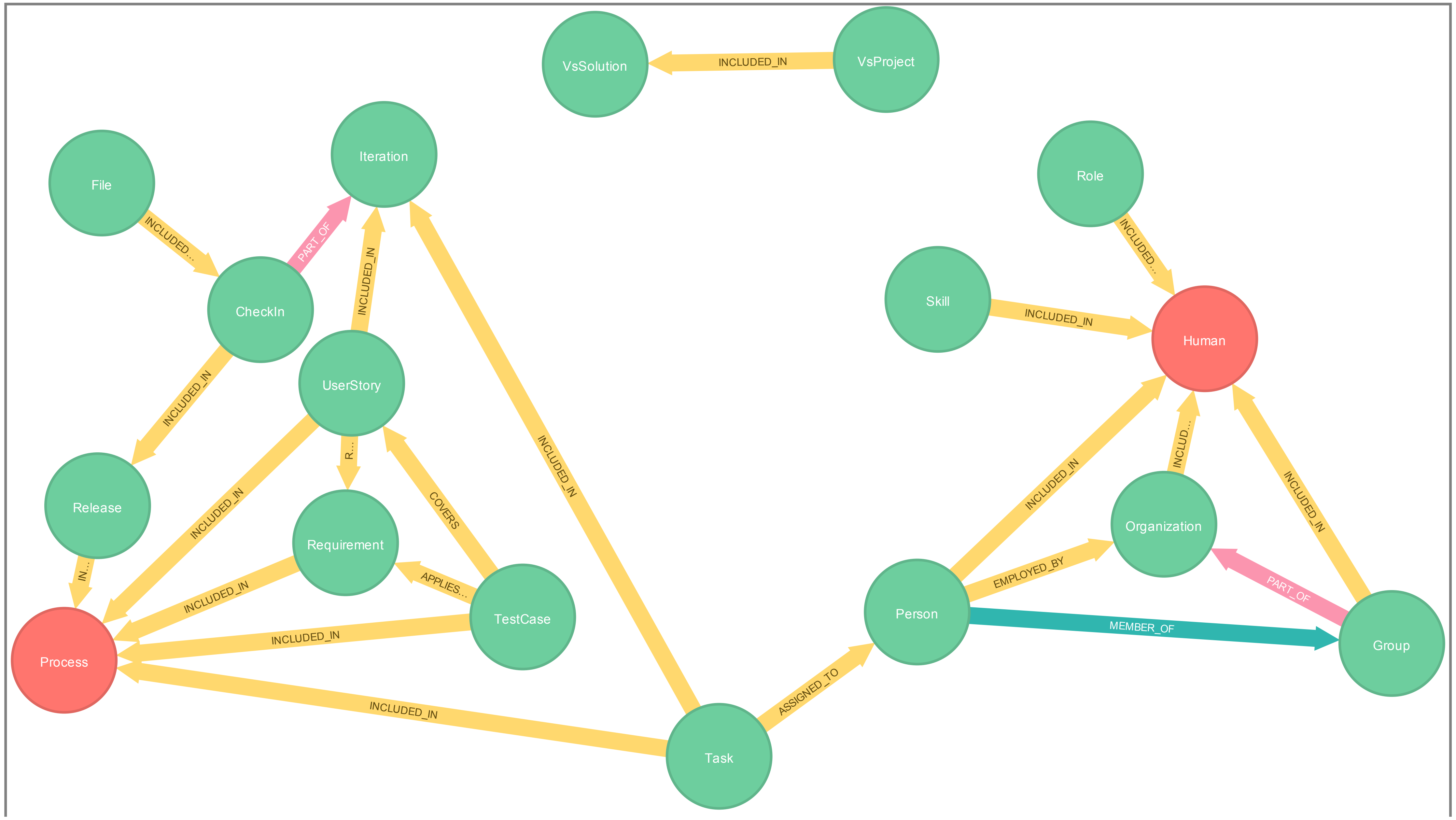
DON'T JUST STOP THERE!

- User stories
- Back log
- Requirements documents
- Test cases

THINK VISUALLY



SEE WHAT'S MISSING


VsSolution
INCLUDED_IN
VsProject
File
Iteration
INCLUDED...
PART_OF
CheckIn
INCLUDED_IN
UserStory
INCLUDED_IN
Role
INCLUDED...
Skill
INCLUDED_IN
Human
Release
INCLUDED_IN
R...
COVERS
INCLUDED_IN
INCLUDED_IN
INCLUD...
Requirement
Organization
INCLUDED_IN
IN...
APPLIES...
EMPLOYED_BY
PART_OF
INCLUDED_IN
TestCase
Person
MEMBER_OF
Group
Process
INCLUDED_IN
ASSIGNED_TO
INCLUDED_IN
Task

BUSINESS ANALYSTS WIN!

REQUIREMENTS COVERAGE

BETTER ACCEPTANCE TESTS

QA:

TACKLE YOUR TESTS!

- Automated tests
- Integration tests
- Unit tests
- Features

WHAT FEATURES DID KEVIN AFFECT?

```
// What features did Kevin affect?
MATCH (checkin:CheckIn { name: "Change set 2231"
 })
MATCH (css_file)-[:INCLUDED_IN]->(checkin)
MATCH (css_file)-[]-(vw:MvcView)
MATCH (vw)-[fr*1..3]-(feature:Feature)
RETURN checkin, css_file, vw, feature, fr;
```

Try it!

DATA: WHAT TESTS DOES QA NEED TO RUN?

```
// Data: What tests does QA need to run?
MATCH (checkin:CheckIn { name: "Change set 2231" })
MATCH (css_file)-[:INCLUDED_IN]->(checkin)
MATCH (css_file)-[]-(vw:MvcView)
MATCH (vw)-[fr*1..3]-(feature:Feature)
MATCH (t_case:TestCase)-[]-(t_suite:TestSuite)-[*1..2]-(feature)
RETURN DISTINCT t_suite.name AS `Test Suite`, t_case.name AS `Test Case`;
```

Try it!

DATA: WHAT NEEDS TESTED FOR THIS RELEASE?

```
// Data: What needs tested for this release?
MATCH (rel:Release { name: "Release v2.3" })-[]-
(checkin:CheckIn)-[*1..4]-(feature:Feature)-[]-(
suite:TestSuite)-[]-(testCase:TestCase)
RETURN DISTINCT rel.name AS `Release`,
checkin.name AS `Check-in`,
suite.name AS `Test Suite`,
testCase.name AS `Test Case`;
```

Try it!

QA WINS!

BROADER COVERAGE

FEWER REGRESSIONS

MORE AUTOMATION

PROJECT LEADERSHIP

NEEDS TO KNOW:

- What's scheduled
- Release notes

WHAT'S SCHEDULED FOR RELEASE V2.3?

```
// What's scheduled for Release v2.3?
MATCH (release_v2_3:Release { name : "Release v2
.3" })
OPTIONAL MATCH (release_v2_3)<-[r]-()
RETURN release_v2_3, r;
```

Try it!

WHAT'S IN RELEASE V2.3?

```
// What's in release v2.3?
MATCH (rel_v2_3:Release { name: "Release v2.3" }
)
OPTIONAL MATCH (rel_v2_3)-[]-(checkin:CheckIn)
RETURN rel_v2_3, checkin;
```

Try it!

PROJECT LEADERSHIP

REPORTING WITH CONFIDENCE

INCREASED CREDIBILITY

OPERATIONS

NEEDS TO KNOW:

- What's deployed
- What's at risk

ADD V2.3 TO UAT

```
// Add v2.3 to UAT
MATCH (rel_v2_3:Release { name: "Release v2.3" }
)
MATCH (uat:Environment { name: "UAT Environment"
})
MERGE (rel_v2_3)-[r_1_3:DEPLOYED_IN]->(uat)
RETURN uat, rel_v2_3, r_1_3;
```

Try it!

RELEASES IN ENVIRONMENTS

```
// Releases in environments
MATCH (rel:Release)-[i]-(env:Environment)
RETURN rel, i, env;
```

Try it!

OPERATIONS WINS!

CLARITY OF WHAT'S DEPLOYED

WHO TO CALL FOR SOLUTIONS

BOTTOM LINE

BUSINESS POTENTIAL

MORE PREDICTABILITY

MORE CONFIDENCE

BOLDER INNOVATION

RECAP
WHAT'S NEXT?

ASK YOURSELF...

CAN YOU ANSWER?

- How much test coverage do I have?
  by *feature*, by *release*, by *check-in*?
- Which parts of the app should users re-test?
- *Features* with high code thrash?
- *Features* with most defects?

SO...DOWNLOAD IT!

COMMUNITY EDITION IS FREE!

NEO4J.COM

TRY HOSTING...

Graph Story

- Free trials available

TRY THE GUIDES

&

DOWNLOAD THE E-BOOK

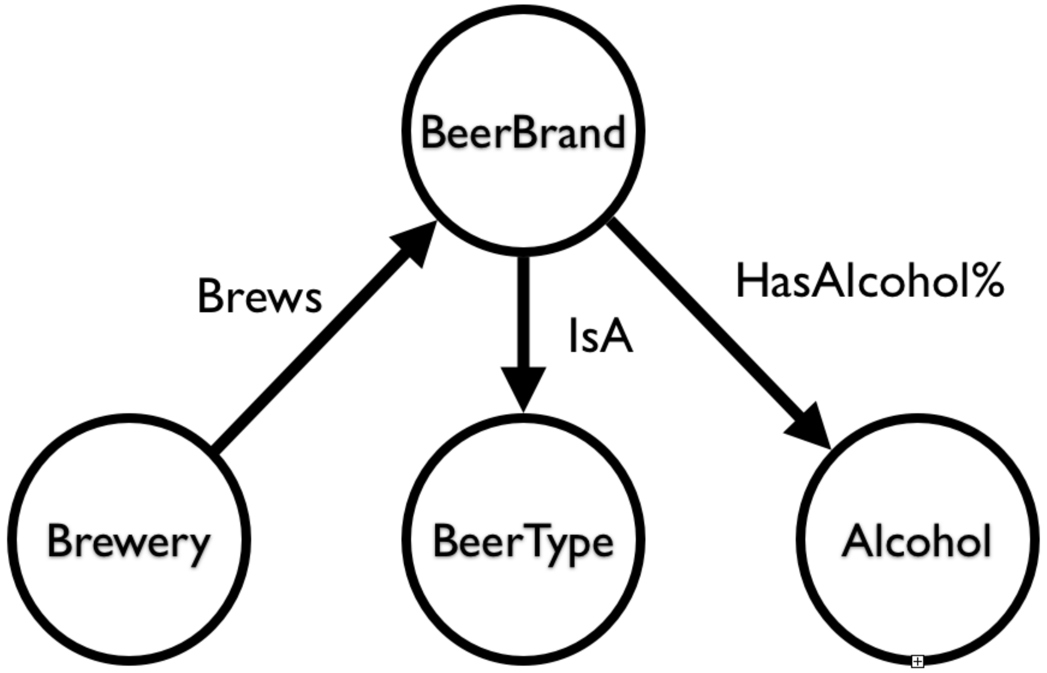
GRAPHDATABASES.COM

GRAPHGISTS

- 80 different problem domains
- Interactive open source samples

GRAPHGIST.NEO4J.COM

AND, EVEN BEER



TINYURL.COM/NEO4BEER

QUESTIONS?

THANK YOU

Code & Slides

jmill.net/neo4j

Connect

jmill.net/connect

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