

Katie Hughes

✨ **@GLITTERINGKATIE** ✨

Katie Hughes

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**“Who is your favorite
superhero?”**

- AUDIENCE (YOU)



the Unbeatable Squirrel
Gi'l



Art by [Erica Henderson](#)



Art by Steve Ditko



Art by Steve Ditko

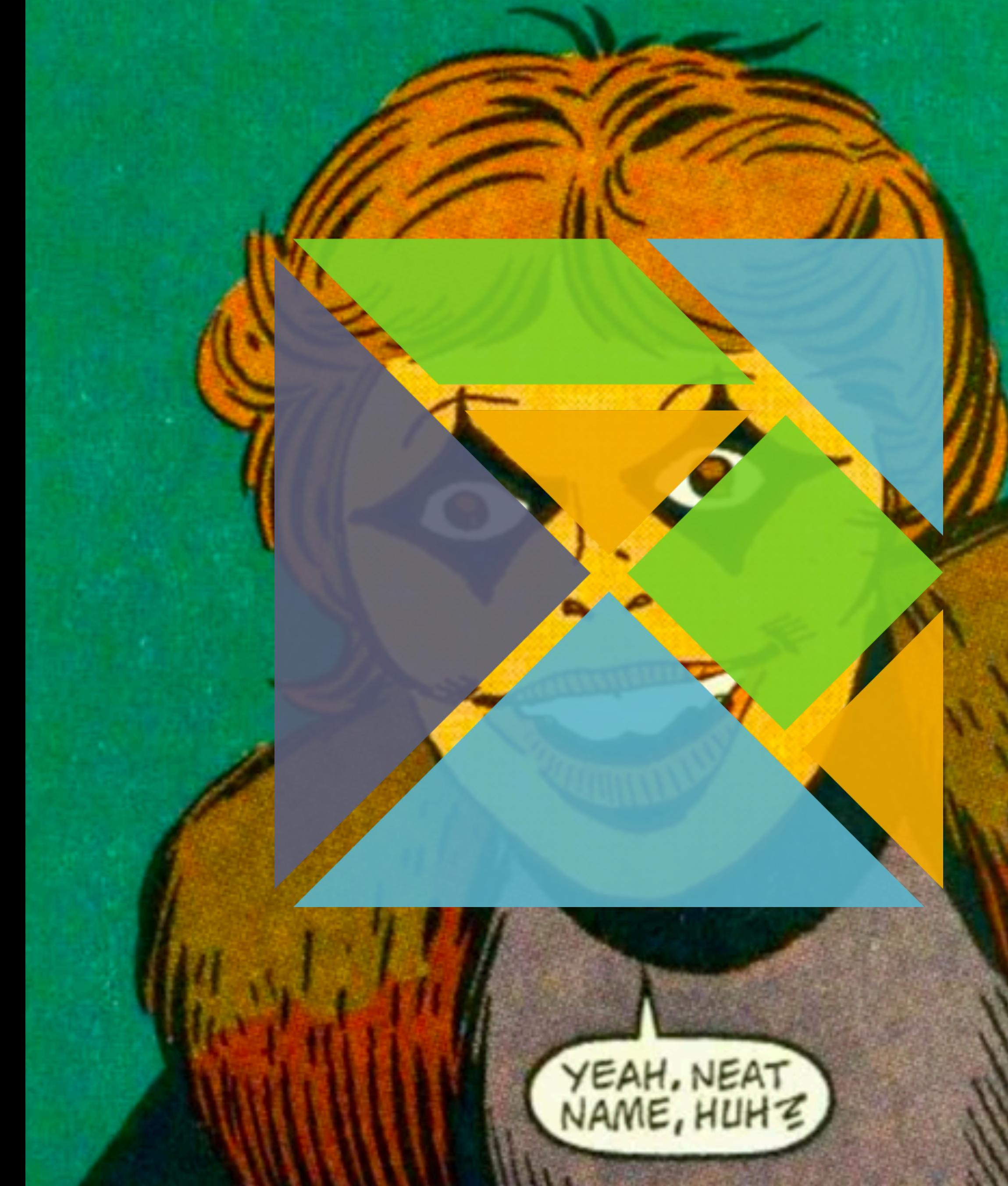


Ryan North



Erica Henderson

EMPATHY!
CONTEXT!



Art by Steve Ditko

surprise:
you're not at a comic con

surprise:
you're not at a comic con
(BUT READ SQUIRREL GIRL)

Marvel has an API!

6 DEGREES OF KEVIN BACON

HOW TO PLAY 6 DEGREES OF KEVIN BACON

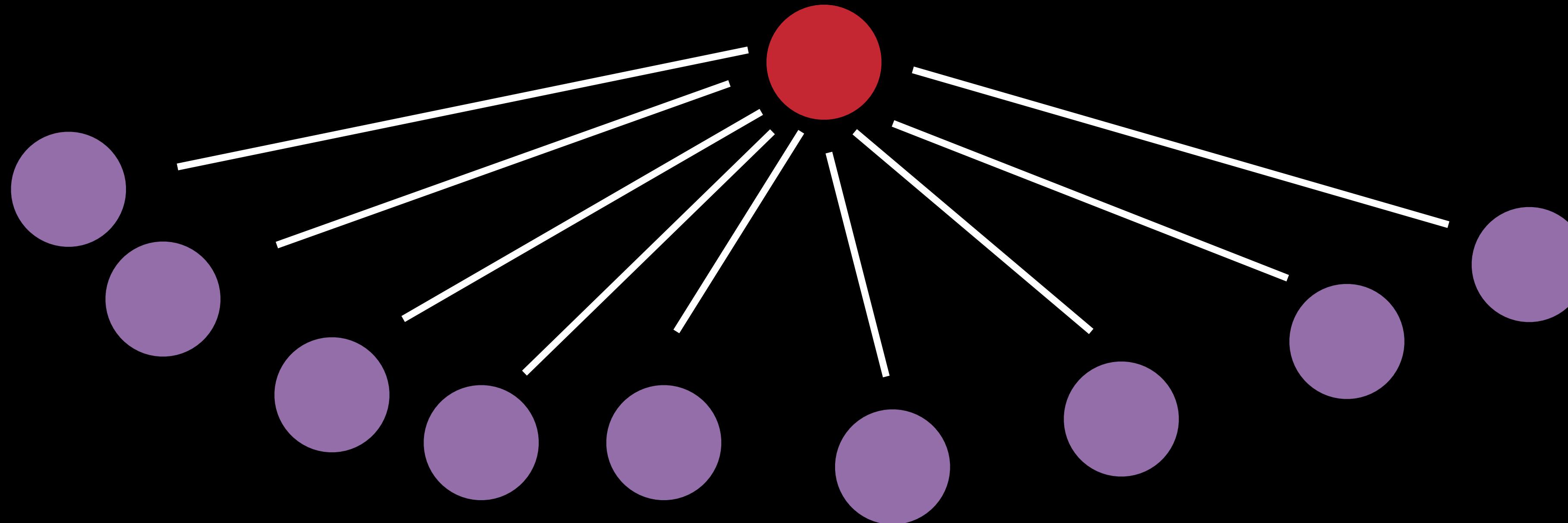
- One person proposes an actor
- Another person connects that actor to Kevin Bacon in 6 connections or fewer
- Fewest connections wins!

Kevin Bacon?

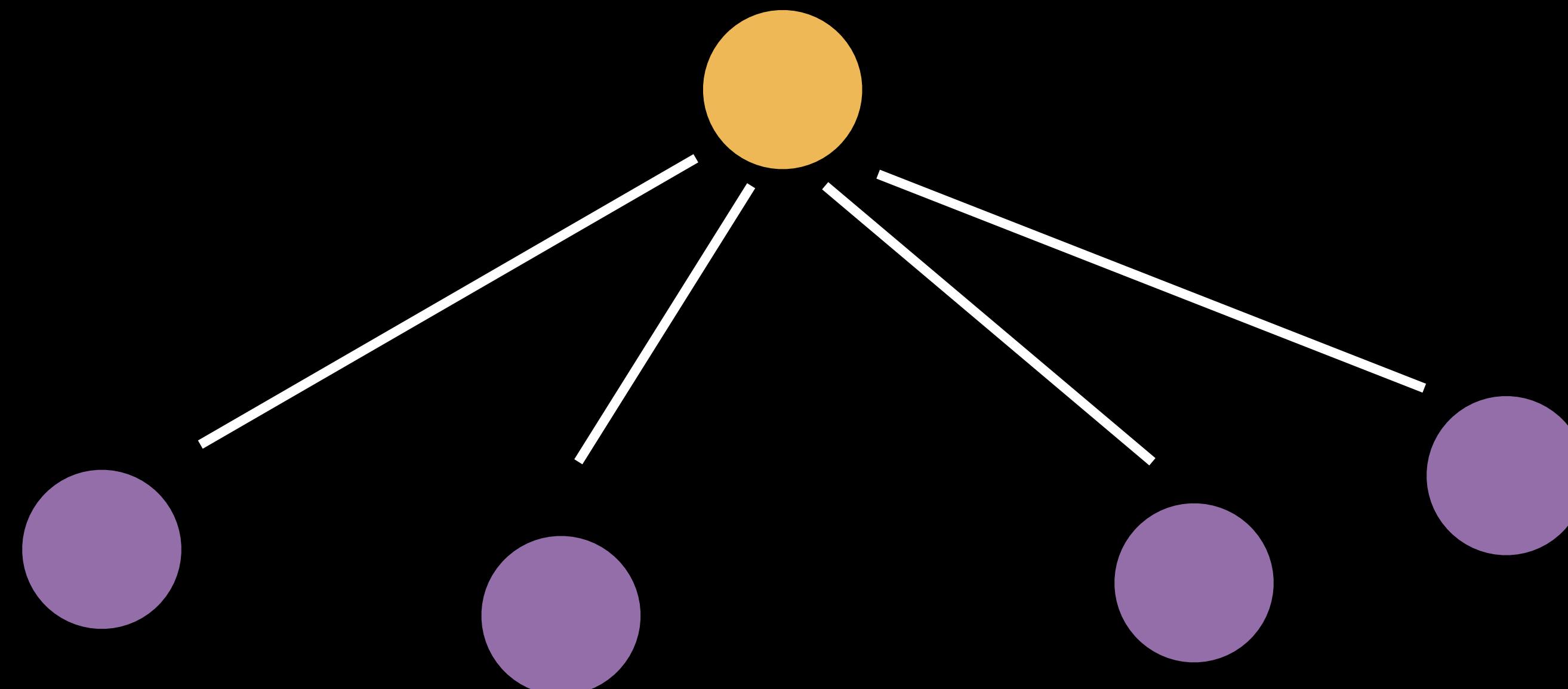
SQUIRREL GIRL!

retconned reason:
Lots of connections in fewer comics

ROOT CHARACTER: SPIDER-MAN



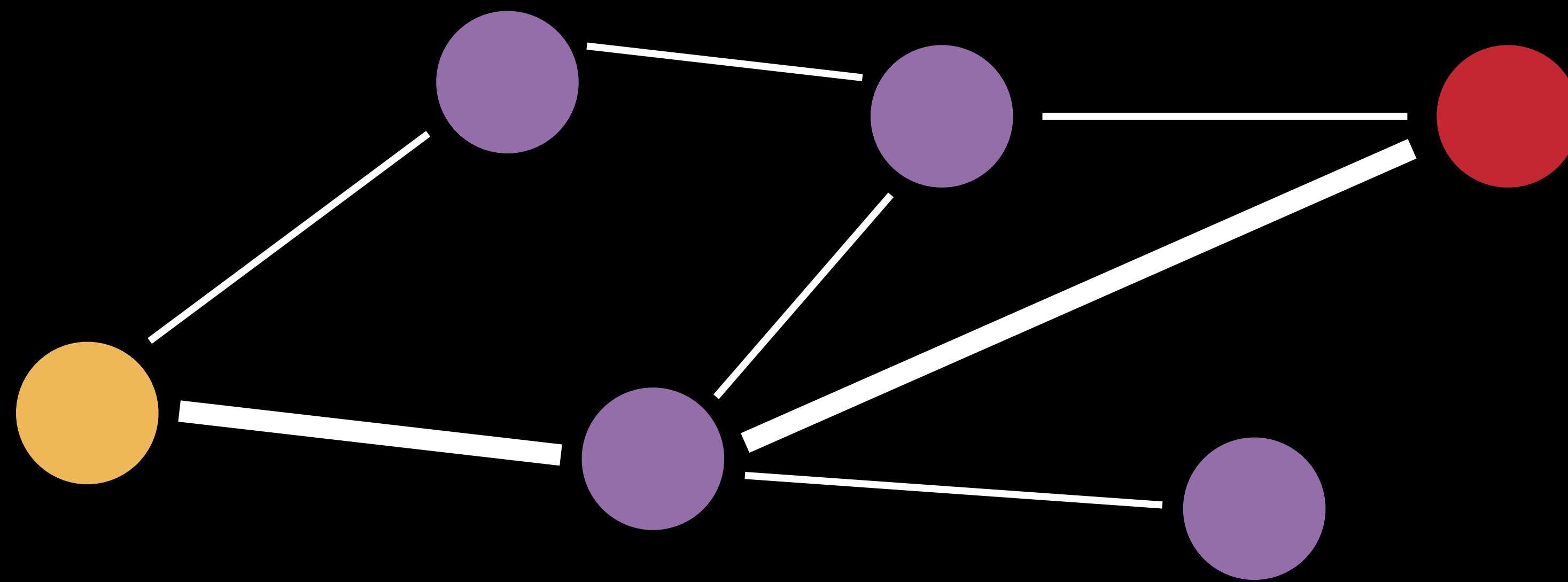
ROOT CHARACTER: SQUIRREL GIRL



6 degrees of Kevin Bacon
cool for movie buffs

6 degrees of Kevin Bacon
cool for movie buffs
great for graph theory!

SHORTEST PATH PROBLEM!



graph theory... api...

GRAPHQL!

MarvelQL by Novvum

What's the point?

(BESIDES TELLING YOU TO READ SQUIRREL GIRL)

What is it like to use a GraphQL
server you don't own?

6 Degrees of Squirrel Girl



Source

Storm

CONNECT TO SQUIRREL GIRL

Storm is in A+X (2012) #3 with Black Panther is in AGE OF
HEROES TPB (Trade Paperback) with Squirrel Girl

LEARNING GOALS

- When using a third party api, be flexible
- When caching, aim for simplicity first

LEARNING GOALS

- When using a third party api, be flexible
- When caching, aim for simplicity first
- ✨ After School Special ✨

MARVEL



001

GRAPHQ-SQUIRREL

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7 59606 08340 4

REST

REST API OVERVIEW

- `/characters/id` gives us information on the character, including the ids of comics that character has been in
- `/comics/id` gives us information on the comic, including the ids of characters who were in that comic

10 comics per character

3 characters per comic

squirrel girl = 1

squirrel girl = 1

1st degree = 10x2

squirrel girl = 1

1st degree = 10×2

2nd degree = $(10 \times 2)^2$

squirrel girl = 1

1st degree = 10×2

2nd degree = $(10 \times 2)^2$

3rd degree = $(10 \times 2)^3$

4th degree = $(10 \times 2)^4$

5th degree = $(10 \times 2)^5$

6th degree = $(10 \times 2)^6$

67,368,421

api calls

so many api calls

too many api calls

rate limit

3000 CALLS

per 24 hours

GRAPHQL

HYPOTHETICAL GRAPHQL TYPES

- **characters** gives us information on the character, including the full comic object
- **comics** gives us information on the comic, including the full character object

1 call!

(not great, not fast.)

```
getCharacter(where: {name: "Squirrel Girl"}) {  
    comics {  
        characters { // first degree  
            comics {  
                characters { // second degree  
                    ...  
                }  
            }  
        }  
    }  
}
```

How do we make it better?

```
{  
  getCharacter(where: {name: "Squirrel Girl"}) {  
    id  
    name  
    comics {  
      characters {  
        id  
        name  
      }  
    }  
  }  
}
```

```
{  
  getCharacter(where:  
    {name: "Tippy Toe"})  
} {  
  id  
  name  
  comics {  
    characters {  
      id  
      name  
    }  
  }  
}  
...  
}
```

```
...  
{  
  getCharacter(where:  
    {name: "Kraven the Hunter"})  
} {  
  id  
  name  
  comics {  
    characters {  
      id  
      name  
    }  
  }  
}
```

6 api calls < 3000 api calls

GREAT! let's go!

ELM-GRAPHQL

```
> elm-graphql https://api.marvelql.com/ --base  
Marvelql --output src/generated
```

Thanks, Dillon Kearns!

MOSTLY REAL API TIME

```
{  
  characters(where: {name: "Squirrel Girl"}) {  
    id  
    comics {  
      name  
      resourceURI  
    }  
  }  
}
```

CONFlict!

Playground - https://api.marvelql.com

api.marvelql.com

getCharacter characters comics getComic +

PRETTIFY HISTORY https://api.marvelql.com/

```
1 {  
2   characters(where: {name:"Squirrel Girl"}) {  
3     name  
4     id  
5     comics {  
6       resourceURI  
7       role  
8       type  
9       name  
10    }  
11  }  
12 }
```

summary

Summary

Summary

TYPE DETAILS

type Summary {

- resourceURI: String
- name: String
- role: String
- type: String

}

Summary

type: String

TYPE DETAILS

The String scalar type represents textual data, represented as UTF-8 character sequences. The String type is most often used by GraphQL to represent free-form human-readable text.

scalar String

SCHEMA DOCS

QUERY VARIABLES HTTP HEADERS

```
type Summary {  
    resourceURI: String  
    name: String  
    role: String  
    type: String  
}
```

```
{  
  getCharacter(where: {name: "Squirrel Girl"}) {  
    id  
    name  
    comics {  
      name  
      resourceUri  
    }  
  }  
}
```

```
{  
  getComic(where: {title: "Marvel Rising (2019) #1"}) {  
    id  
    name  
    characters {  
      name  
      resourceUri  
    }  
  }  
}
```

12 calls < 3000 calls

```
{  
  getComic(where: {title: "Marvel Rising (2019) #1"}) {  
    id  
    name  
    characters {  
      name  
      resourceUri  
    }  
  }  
}
```

**"Field \"title\" is not defined by type
ComicWhereInput."**

```
{  
  "resourceURI": "http://gateway.marvel.com/v1/  
public/comics/75461",  
  "role": null,  
  "type": null,  
  "name": "Marvel Rising (2019) #1"  
}
```

```
{  
  getComic(where: {id: 75461}) {  
    id  
    name  
    characters {  
      name  
      resourceUri  
    }  
  }  
}
```

**"Field \\"id\\" is not defined by type
ComicWhereInput."**

```
type ComicWhereInput {  
    format: ComicFormat  
    formatType: ComicFormatType  
    noVariants: Boolean  
    dateDescriptor: DateDescriptor  
    dateRange: Int  
    diamondCode: String  
    digitalId: Int  
    upc: String  
    isbn: String  
    ean: String  
    ...  
    ...  
    issn: String  
    hasDigitalIssue: Boolean  
    modifiedSince: DateTime  
    creators: [ID!]  
    characters: [ID!]  
    series: [ID!]  
    events: [ID!]  
    stories: [ID!]  
    sharedAppearances: [ID!]  
    collaborators: [ID!]  
}
```

CONFlict!

lesson #1

BE FLEXIBLE

```
{  
  "resourceURI": "http://gateway.marvel.com/v1/  
public/comics/75461",  
  "role": null,  
  "type": null,  
  "name": "Marvel Rising (2019) #1"  
}
```

[http://gateway.marvel.com/v1/
public/comics/75461/characters](http://gateway.marvel.com/v1/public/comics/75461/characters)

1 GraphQL call

1 GraphQL call
Rest? REST

Before

$$1 + (10 \times 2) + (10 \times 2)^2 + 20^3 + 20^4 + 20^5 + 20^6 =$$

67,368,421

Before

$$1 + (10 \times 2) + (10 \times 2)^2 + 20^3 + 20^4 + 20^5 + 20^6 =$$

67,368,421

After

$$1 + 10^2 + 10^3 + 10^4 + 10^5 + 10^6 =$$

1,111,101

1,111,101 < 67,368,420

$3,000 < 1,111,101$

MARVEL



002

STORING NUTS FOR WINTER

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00211

```
type alias PendingComics =  
    Dict Int Api.Comic
```

```
type WorkingConnections  
= NotAsked  
| Asked (List (Dict Int Connection))  
| FoundConnection Answer  
| NoConnection  
| Error String
```

```
type alias Connection = { character : String  
, comic : Comic  
, parentId : Int  
}
```

```
type alias Answer = List Connection
```

```
✨ type alias PendingComics =  
    Dict Int Api.Comic
```

```
type WorkingConnections  
= NotAsked  
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    | Error String
```

```
type alias Connection = { character : String  
                           , comic : Comic  
                           , parentId : Int  
                         }
```

```
type alias Answer = List Connection
```

```
type alias PendingComics =  
    Dict Int Api.Comic
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type WorkingConnections  
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```
type alias Connection = { character : String  
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, parentId : Int }
```

```
type alias Answer = List Connection
```

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type alias PendingComics =  
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```
type WorkingConnections  
= NotAsked  
| Asked (List (Dict Int Connection))  
| FoundConnection Answer  
| NoConnection  
| Error String
```

```
type alias Connection = { character : String, comic : Comic, parentId : Int }  
type alias Answer = List Connection
```

```
type alias PendingComics =  
    Dict Int Api.Comic
```

```
type WorkingConnections  
    = NotAsked  
    | Asked (List (Dict Int Connection))  
    ✨| FoundConnection Answer  
    | NoConnection  
    | Error String
```

```
type alias Connection = { character : String  
                           , comic : Comic  
                           , parentId : Int  
                         }
```

```
type alias Answer = List Connection
```

6 Degrees of Squirrel Girl



Source

Storm

CONNECT TO SQUIRREL GIRL

Storm is in A+X (2012) #3 with Black Panther is in AGE OF
HEROES TPB (Trade Paperback) with Squirrel Girl

first cache

ANSWERS CACHE

second cache

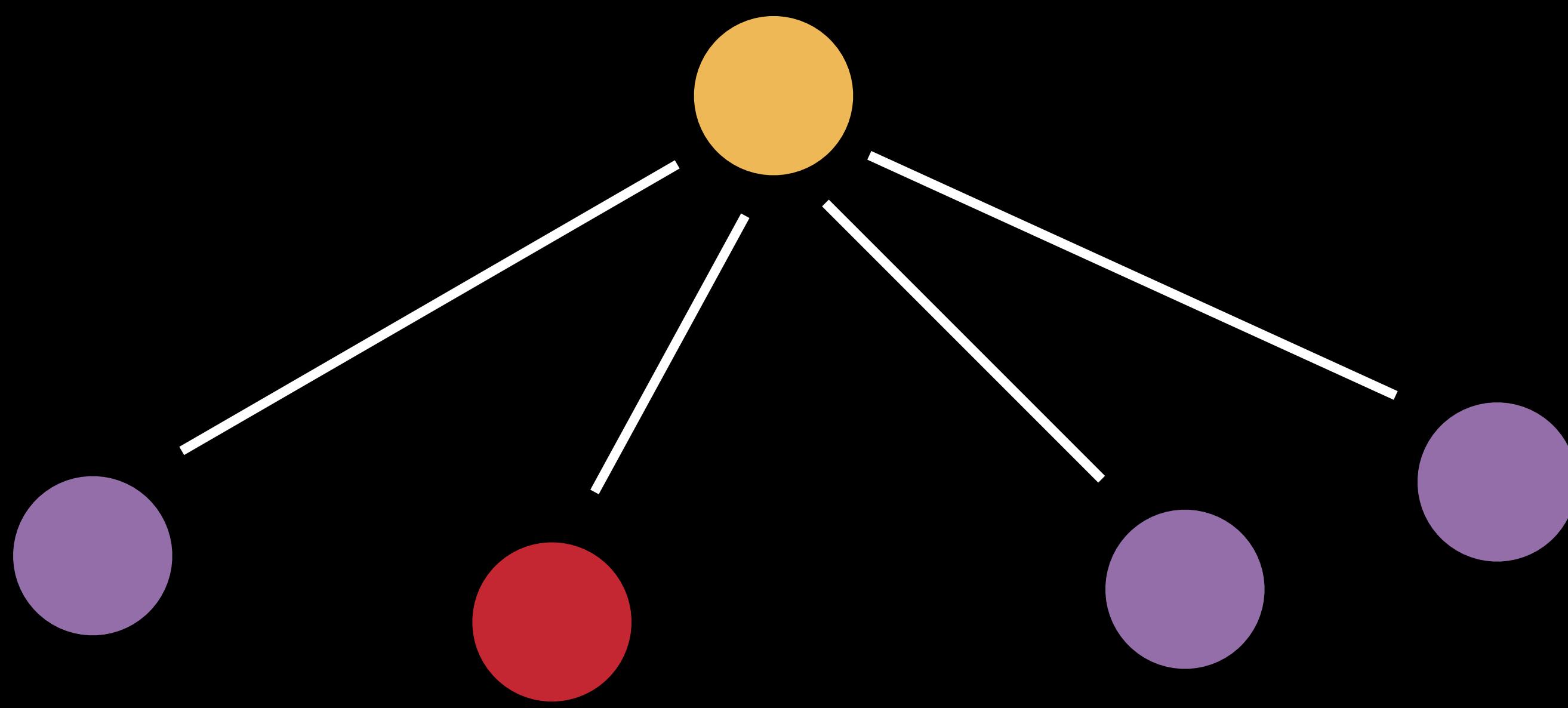
MEDIATING STEPS

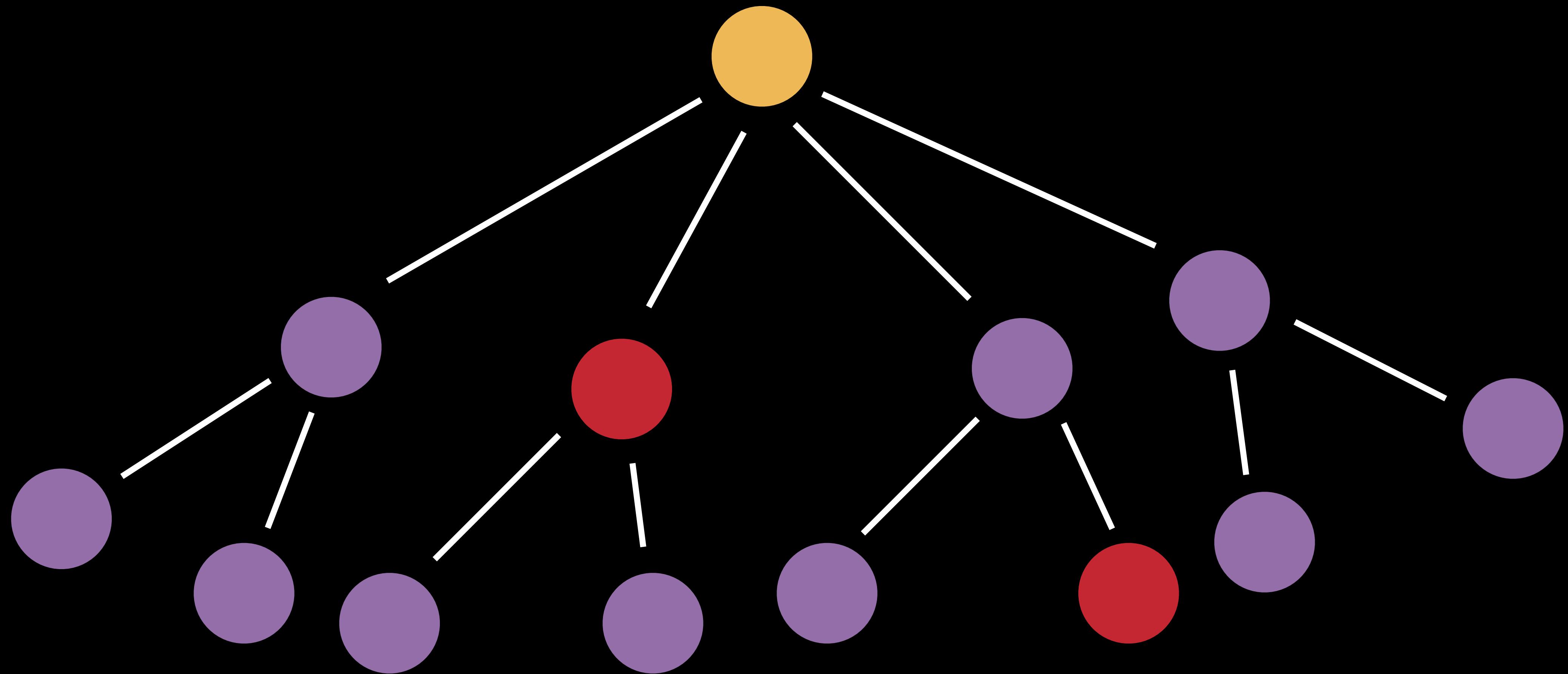
shortest path →

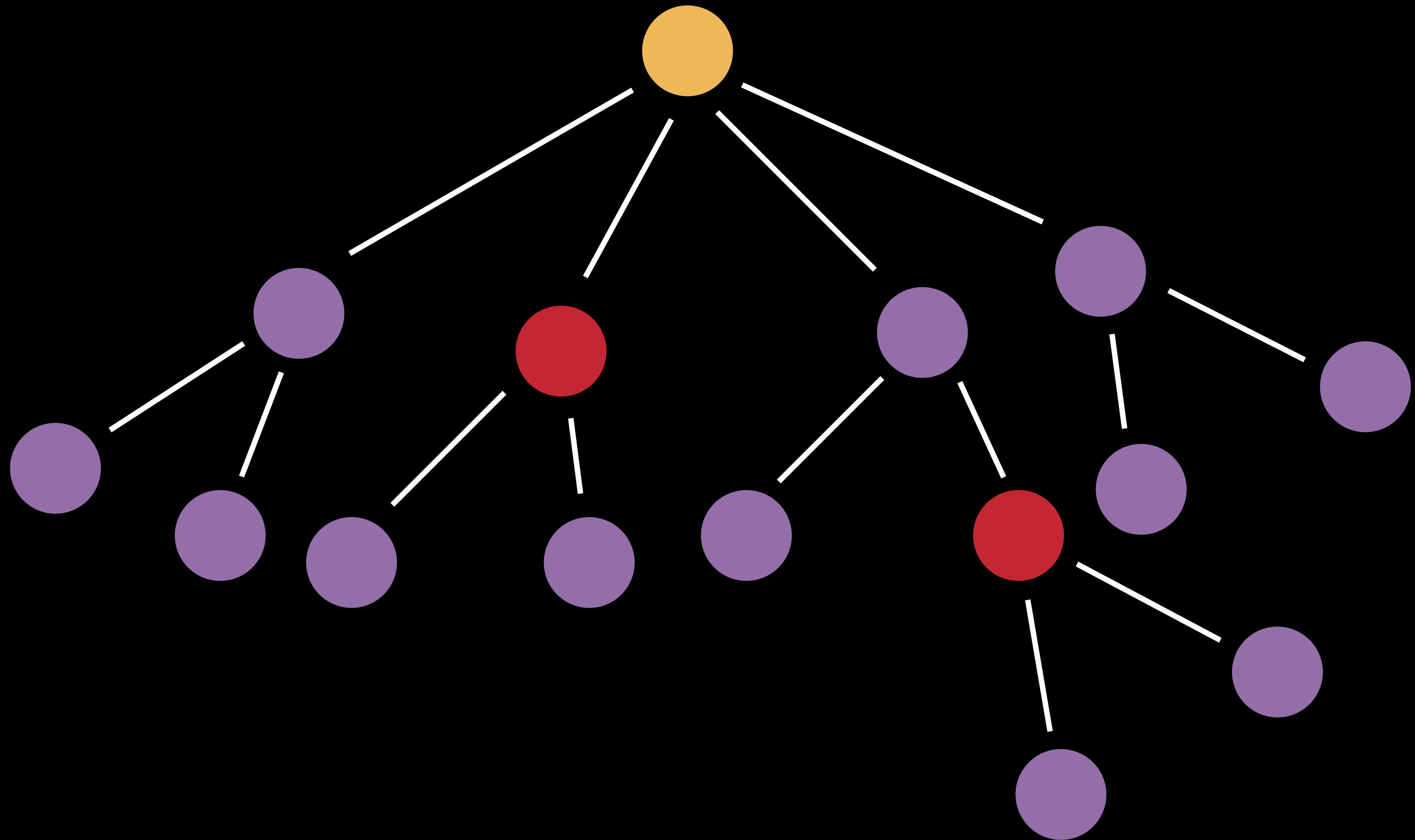
breadth first search

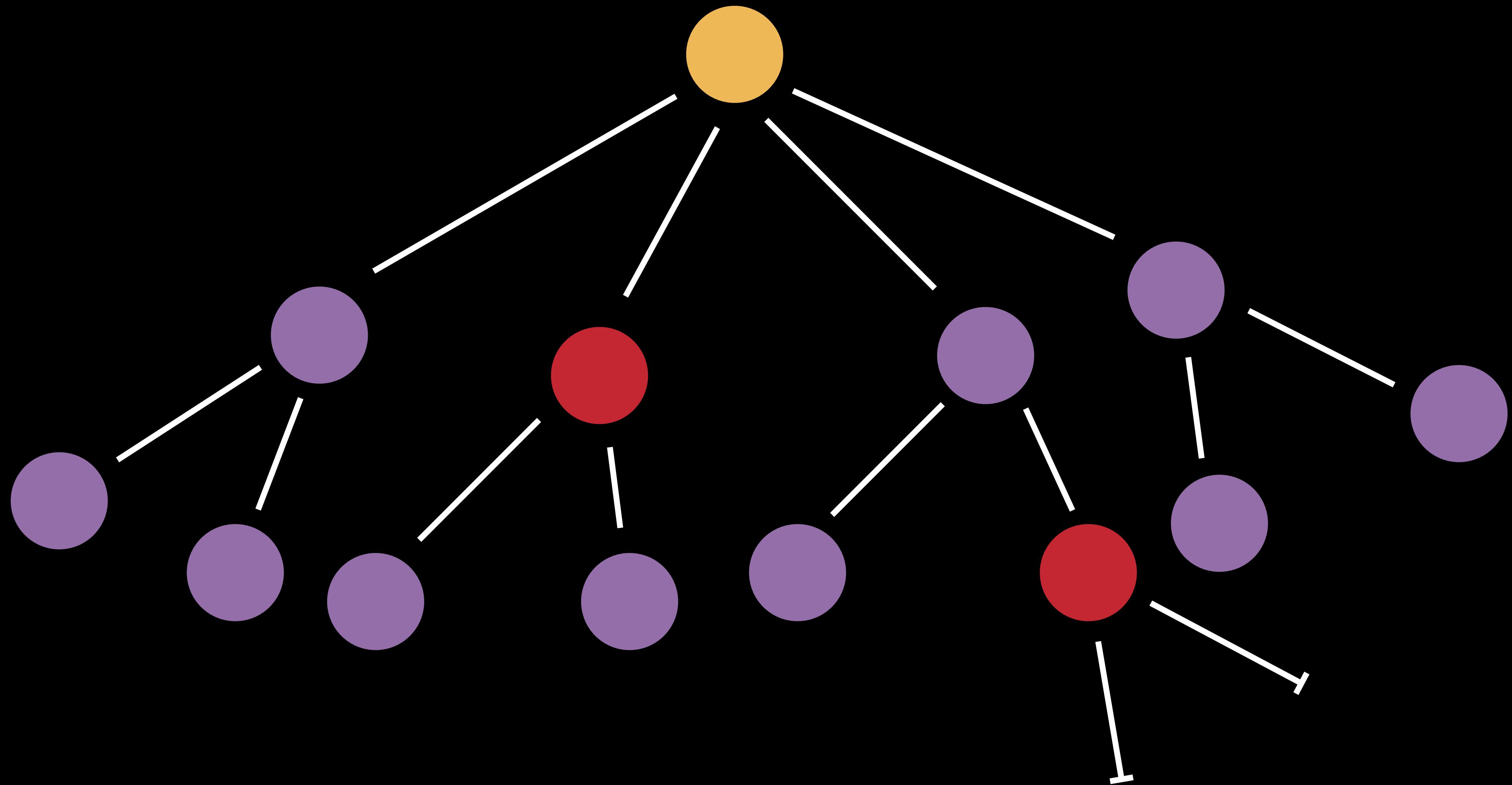
breadth first search

**exhaust first level before
searching through the next level**









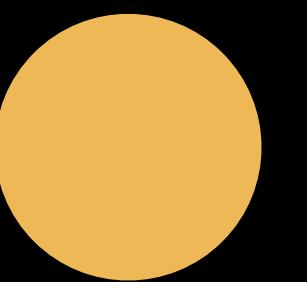
first version

BRANCH CUTTER

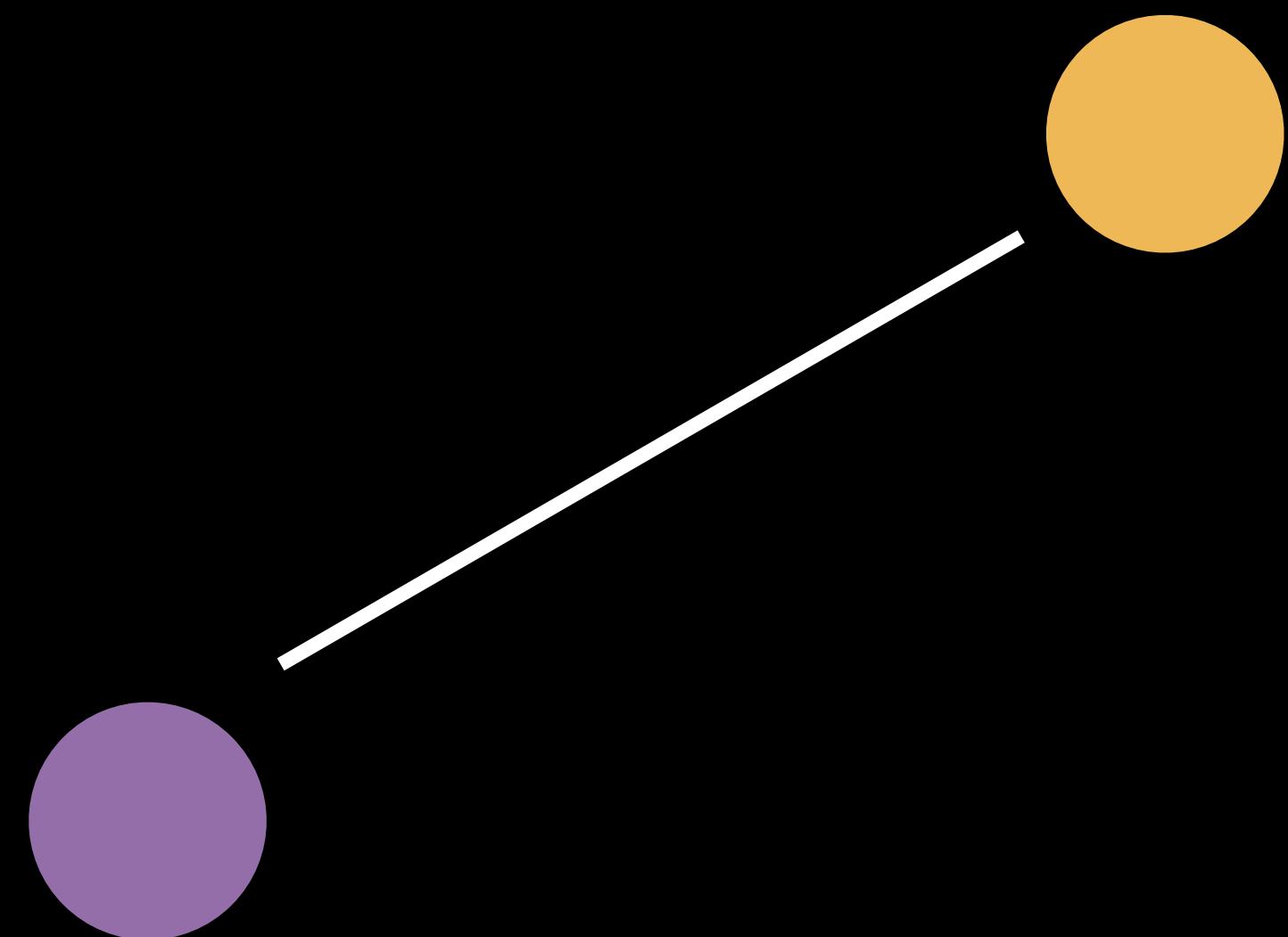
```
type alias ComicCache =  
    Dict Int Comic
```

CONFlict!

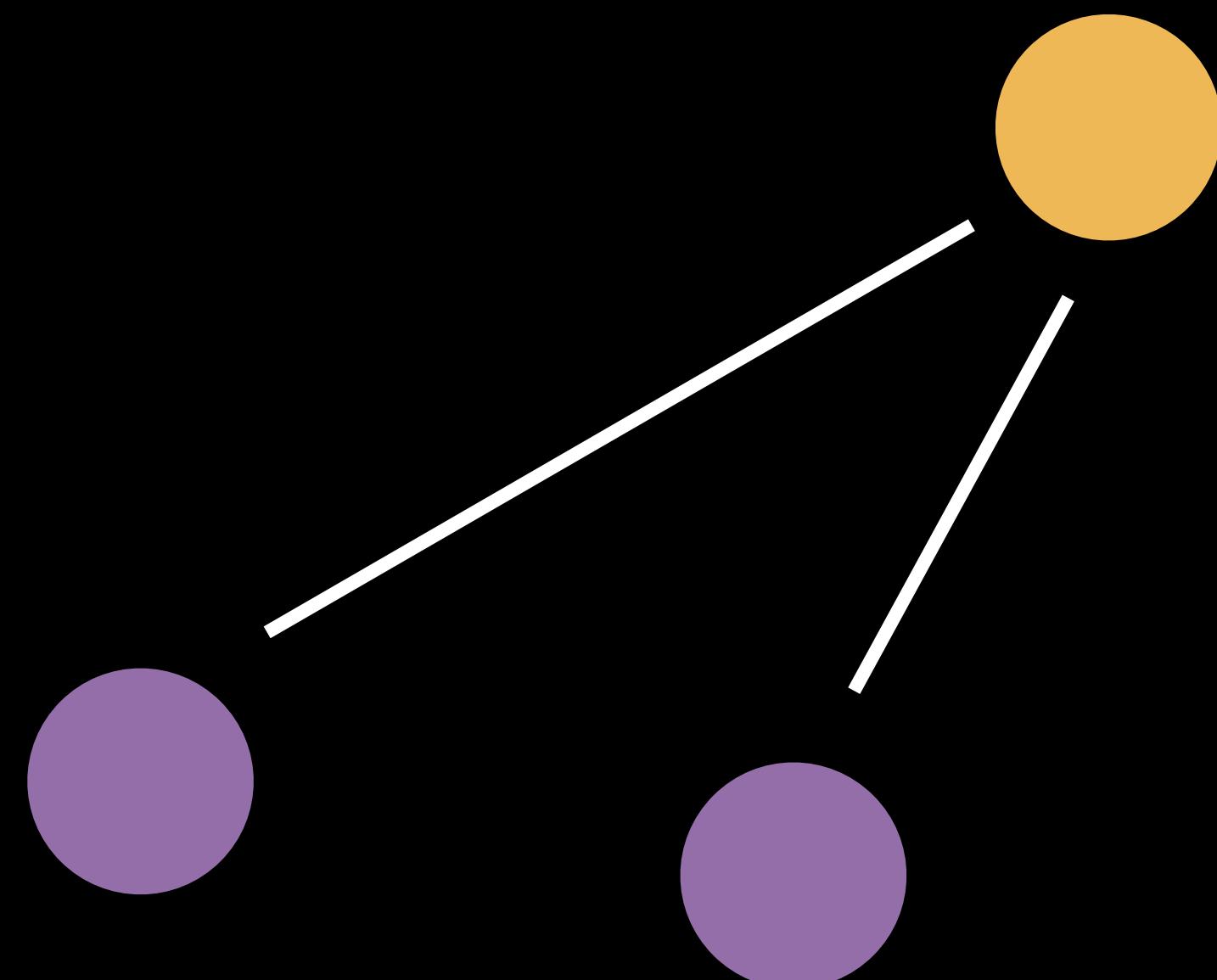
GOAL CHARACTER: SPIDER-MAN



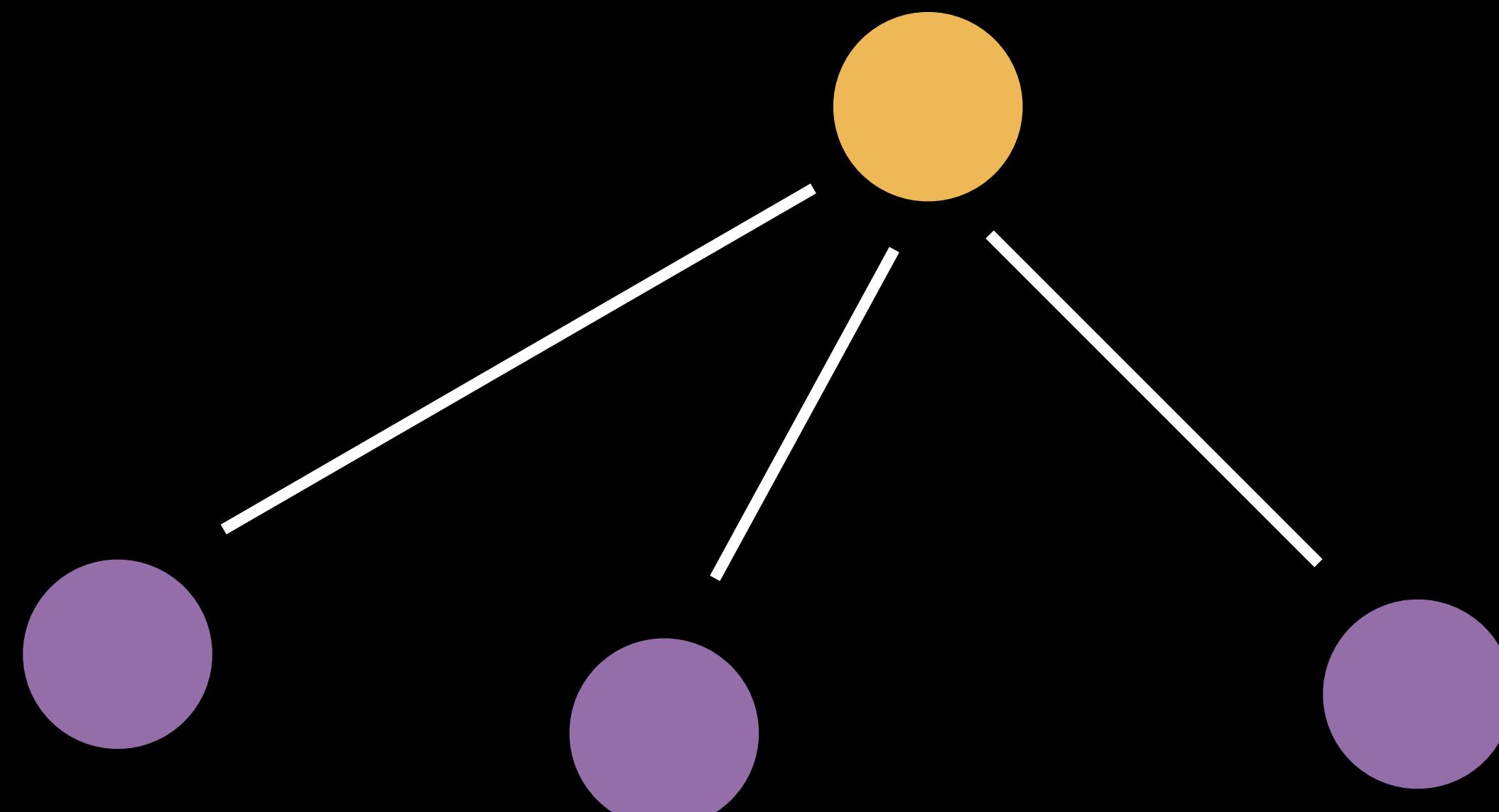
GOAL CHARACTER: SPIDER-MAN



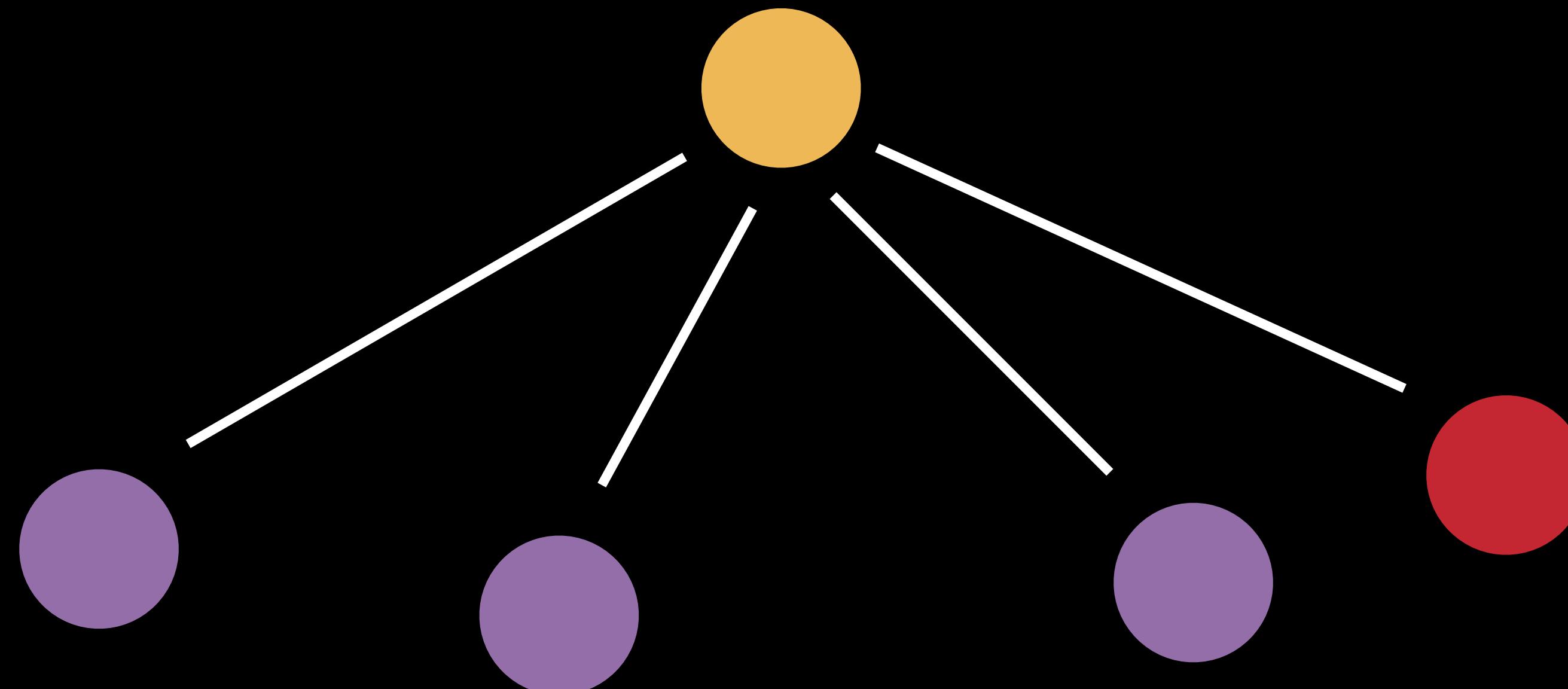
GOAL CHARACTER: SPIDER-MAN



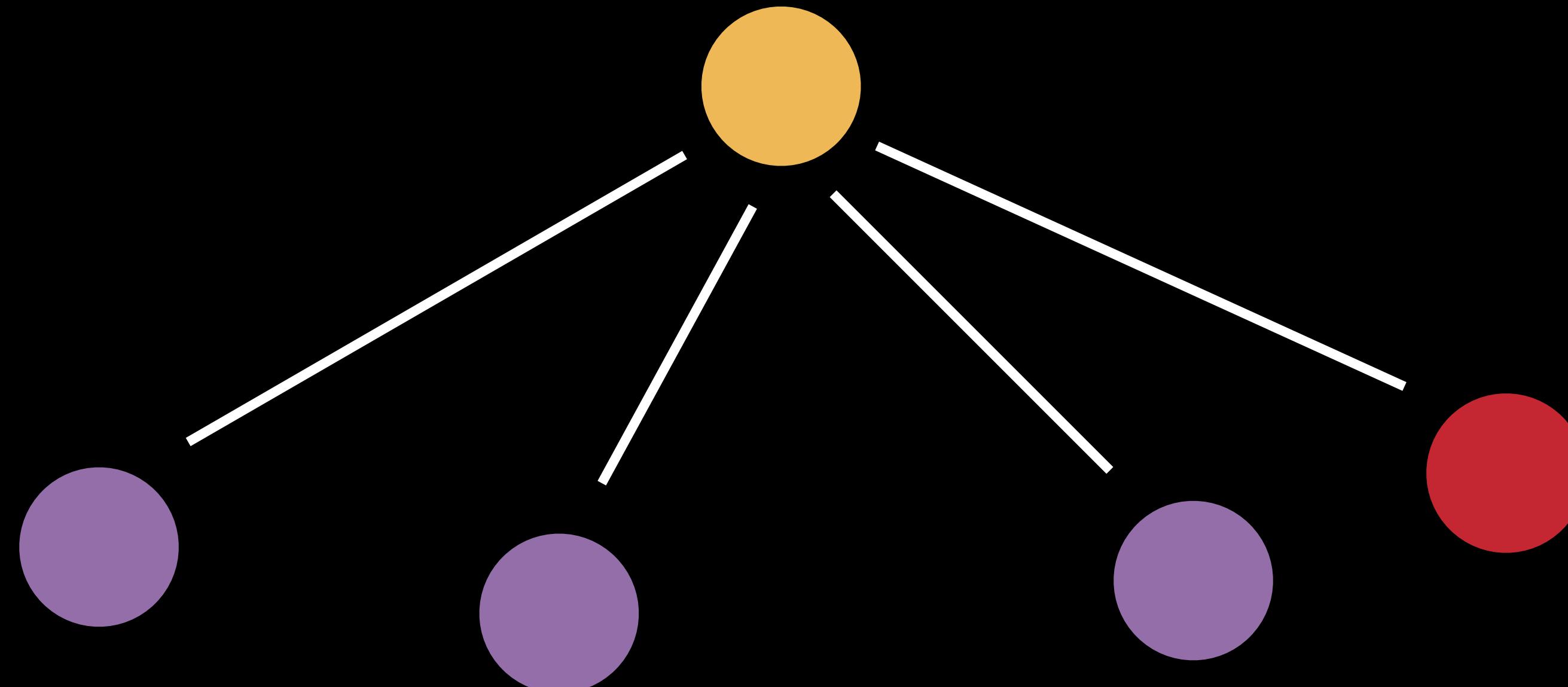
GOAL CHARACTER: SPIDER-MAN



GOAL CHARACTER: SPIDER-MAN

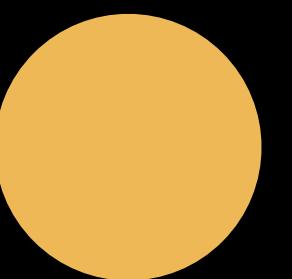


GOAL CHARACTER: SPIDER-MAN

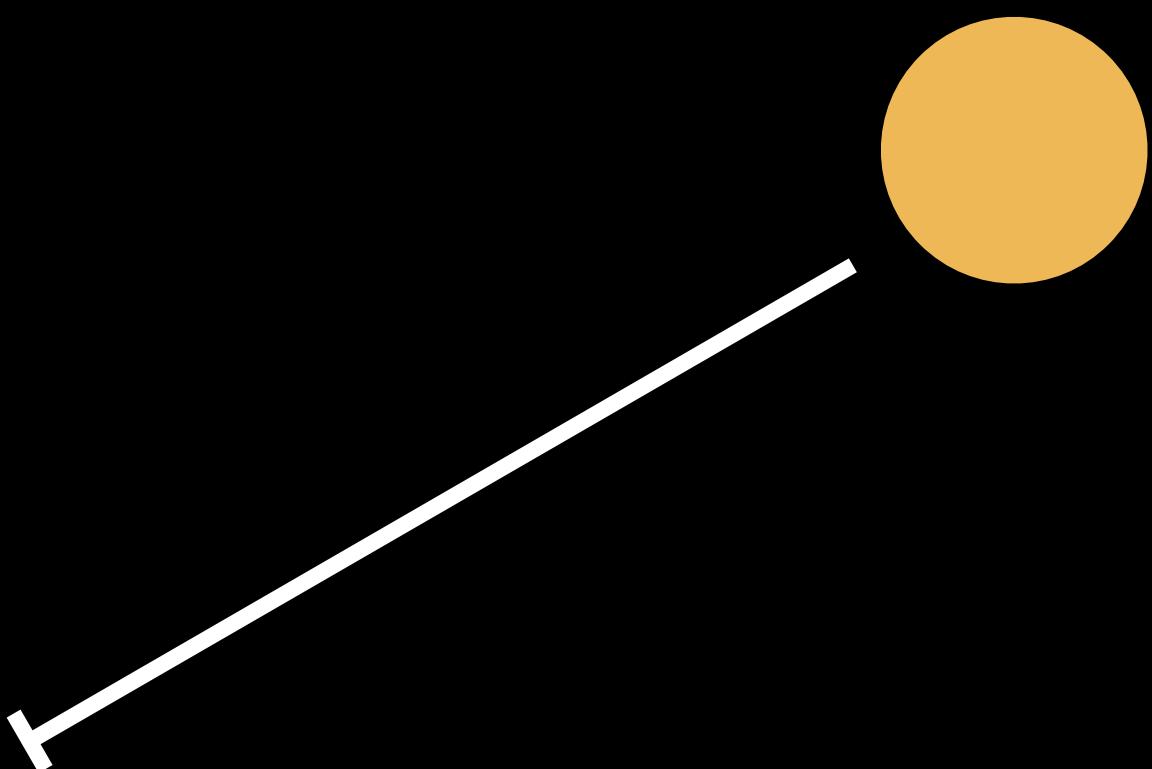


(all of these api calls got cached!)

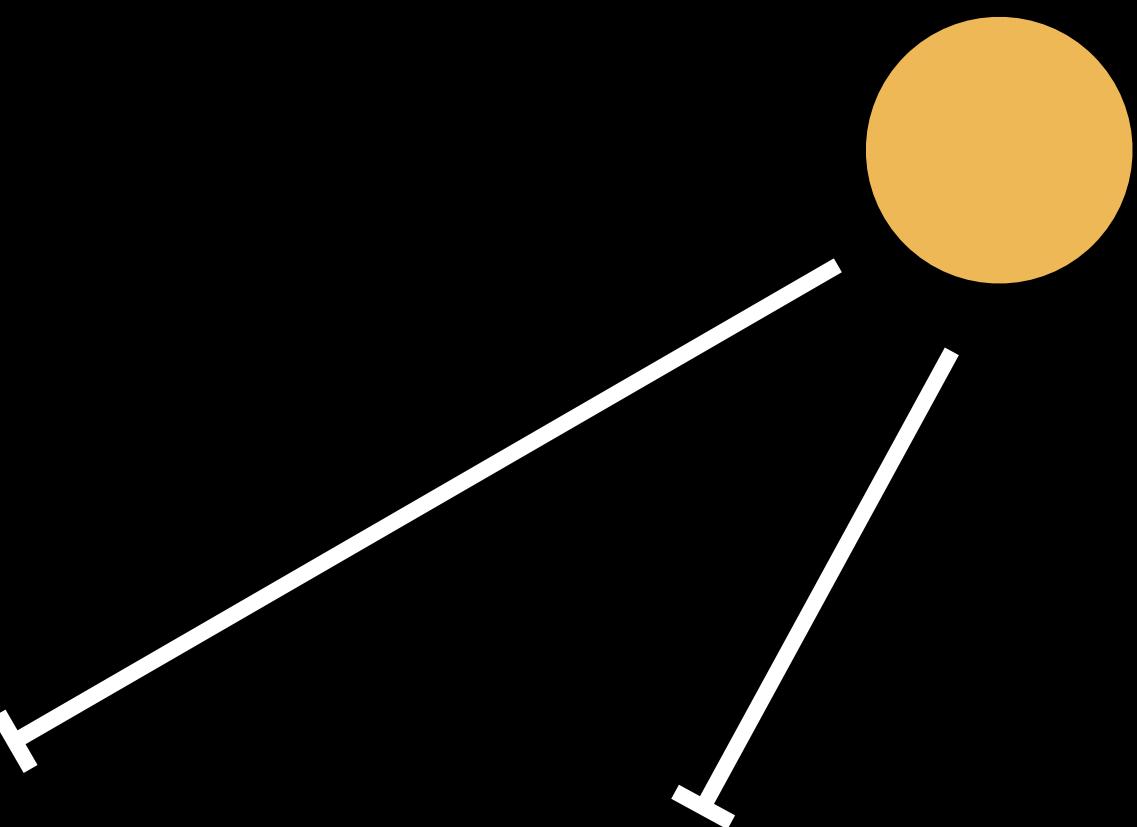
GOAL CHARACTER: WOLVERINE



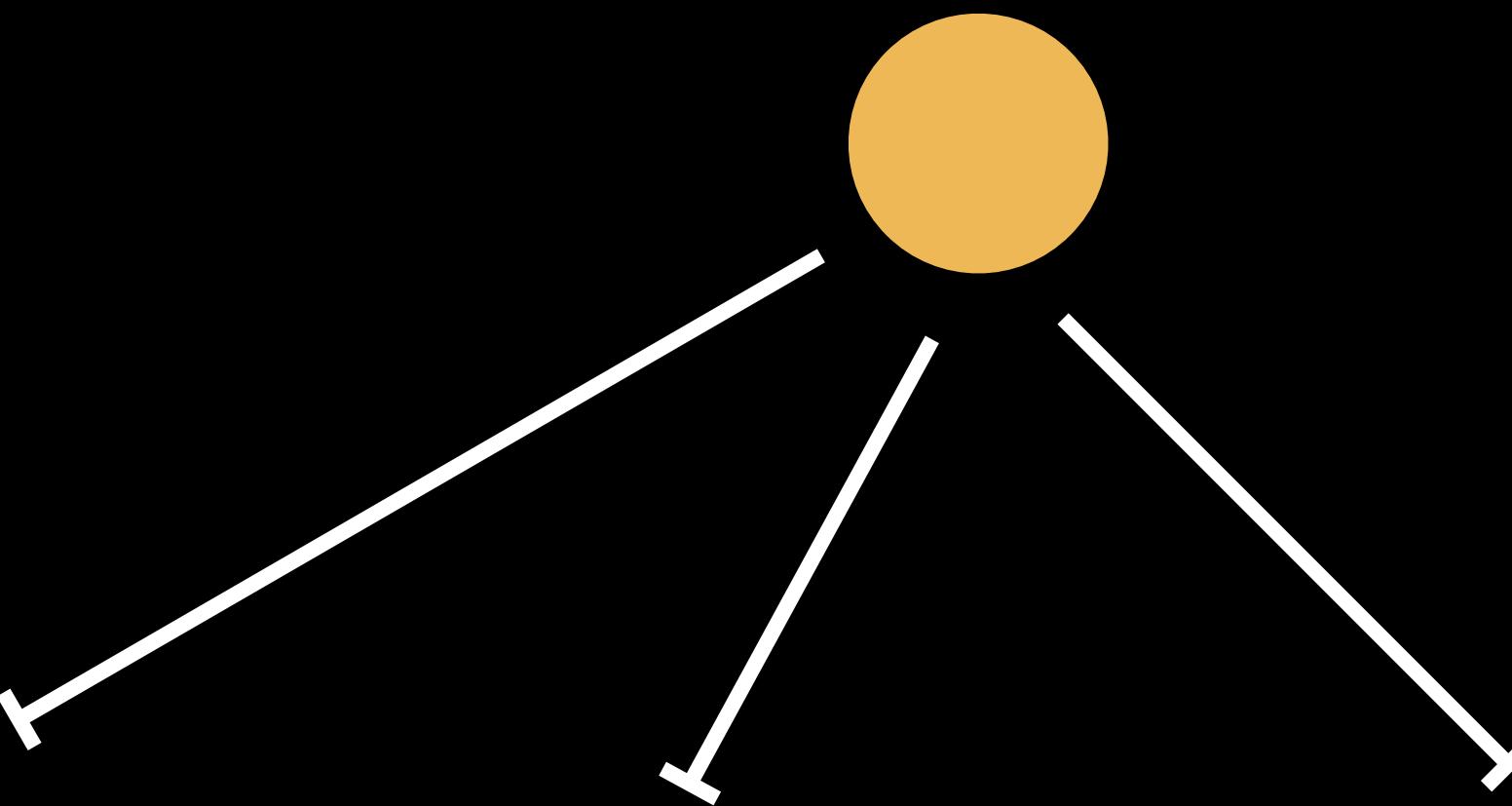
GOAL CHARACTER: WOLVERINE



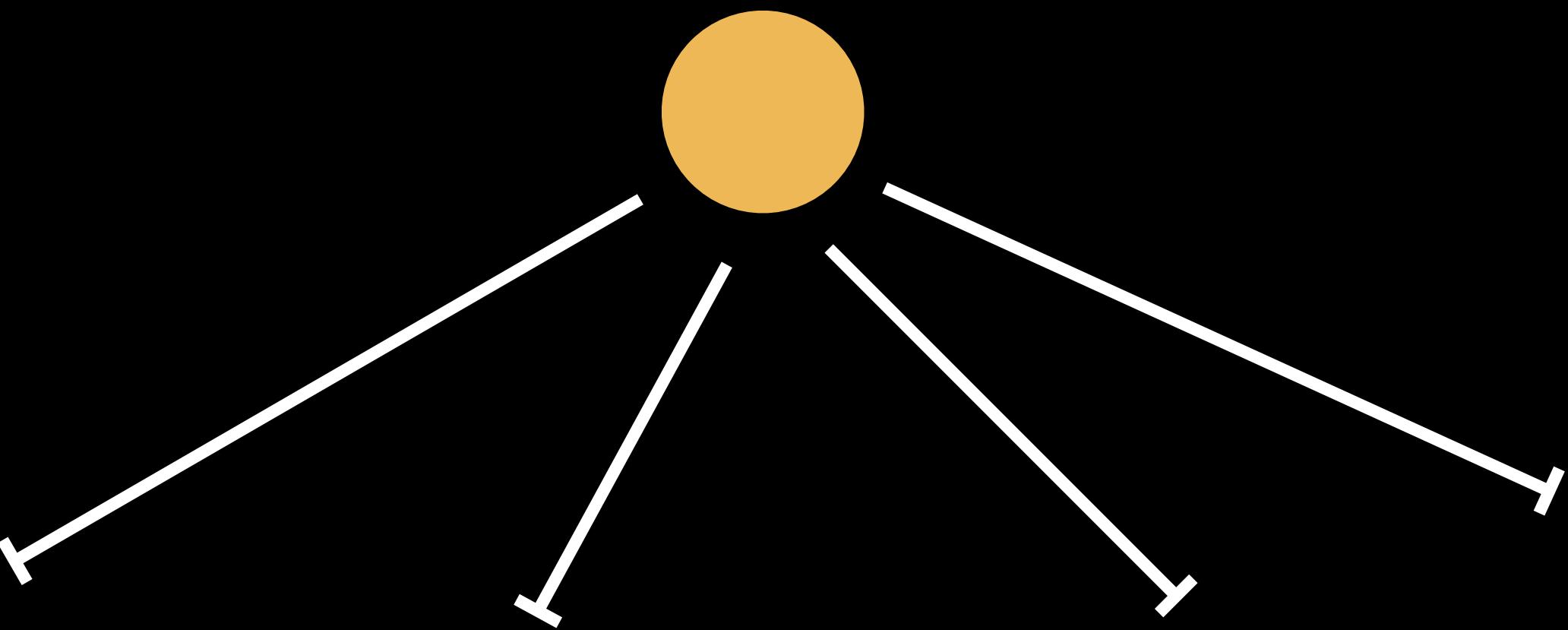
GOAL CHARACTER: WOLVERINE



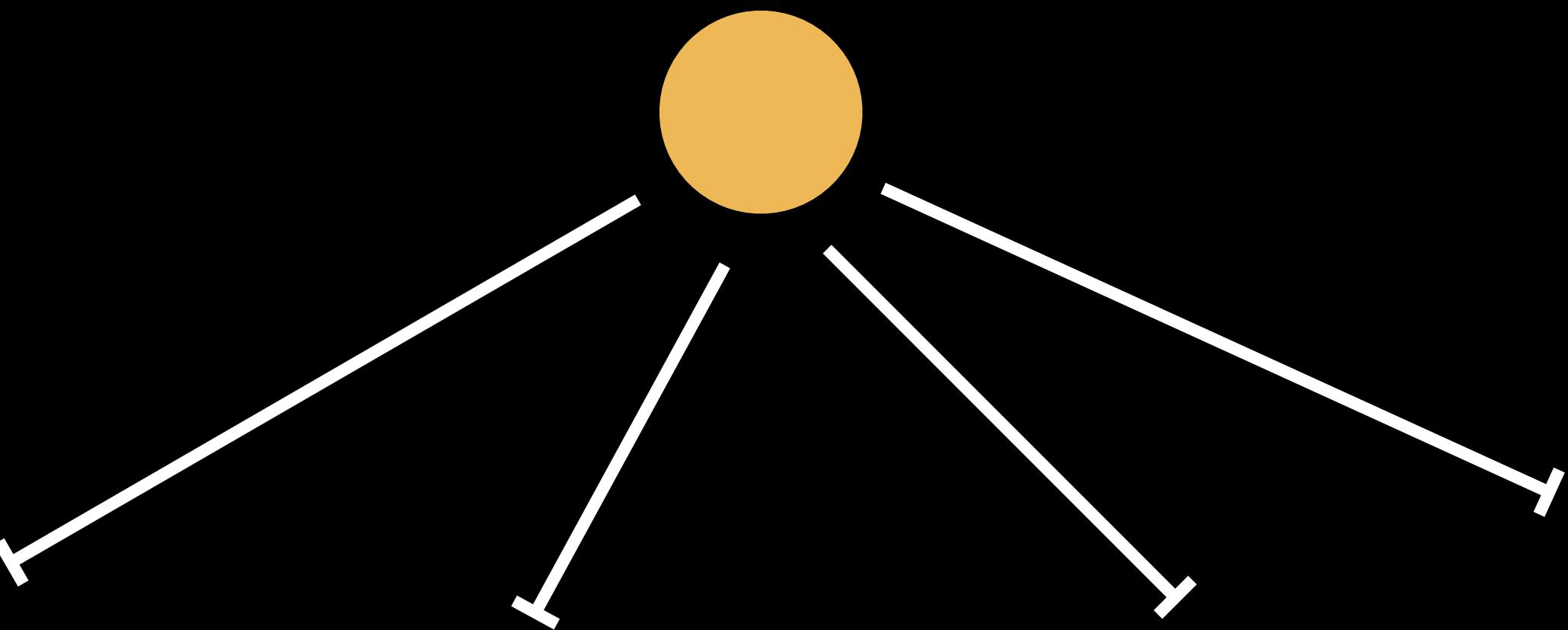
GOAL CHARACTER: WOLVERINE



GOAL CHARACTER: WOLVERINE



GOAL CHARACTER: WOLVERINE



No more branches to search, we're done 😊

WHAT DO I NEED FROM THE CACHE?

- Something PendingComics can use to dequeue with
- Something WorkingConnections can use to build a connection

```
type alias ComicCache =  
    Dict Int Comic
```

```
type alias WorkingCache =  
    Dict Int WorkingConnection
```

```
type alias WorkingConnection =  
    { character : String  
    , comic : Comic  
    , parentId : Int  
    , comics : List Comic  
    }
```

800 api calls 😱

```
type alias WorkingCache =  
    Dict Int WorkingConnection
```

```
type alias WorkingConnection =  
    { character : String  
    , comic : Comic  
    , parentId : Int  
    , comics : List Comic  
    }
```

```
type alias WorkingCache =  
    Dict Int WorkingConnection
```

```
type alias WorkingConnection =  
    { character : String  
    , comic : Comic  
    , parentId : Int  
    , comics : List Comic  
    }
```

WHAT DO I NEED FROM THE CACHE?

- Something PendingComics can use to dequeue with
- Something WorkingConnections can use to build a connection

My model should be agnostic
of where the data comes from

oh.

Cache the api response itself.

```
type alias ComicsApiCache =  
    Dict Int (List ComicsForCharacter)
```

lesson #2

CACHE SIMPLY

600 api calls ... ?



600 is still big...

AFTER SCHOOL SPECIAL

Write Tests.

Writing tests helps you iterate
when dealing with an api rate limit.

Writing tests for a personal
project is self care.

pro tip:

WRITE TESTS.

“live enough” demo

6 Degrees of Squirrel Girl



Source

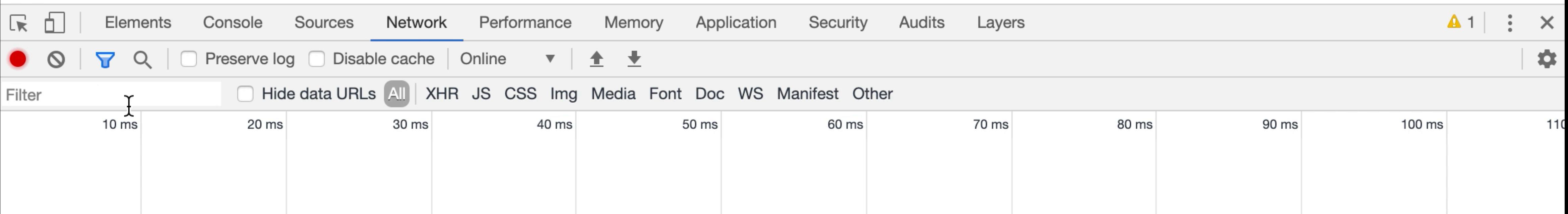


CONNECT TO SQUIRREL GIRL

Cached Comics

Pending Comics

Data provided by Marvel. © 2014 Marvel



[https://github.com/
glitteringkatie/squirrel-degrees](https://github.com/glitteringkatie/squirrel-degrees)

LESSONS LEARNED

- When using a third party api, be flexible
- When caching, aim for simplicity first
- After School Special - tests are good 

MORE TAKEAWAYS

- Read Squirrel Girl
- Support your Local Comic Book Store
- Join #comics

THANK YOU

- Will Murray & Steve Ditko
- Ryan North, Erica Henderson, Derek Charm, Rico Renzi

THANK YOU

- Dillon Kearns - elm-graphql
- Novvum - MarvelQL
- Aaron VonderHaar - beautiful-example
- Elm-conf organizers
- YOU

MARVEL



END

THANK YOU!

@glitteringkatie
Read Squirrel Girl

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