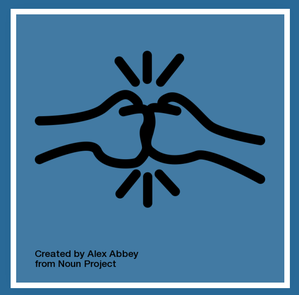
Angular 2 and Observables

The Zan and Jayna of Reactive Component Development



Just in case you don't know...

Wonder Twins

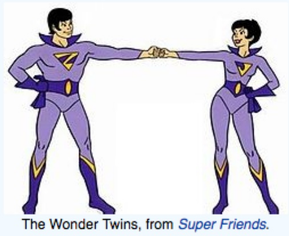
From Wikipedia, the free encyclopedia

The Wonder Twins, **Zan** and **Jayna**, are a fictional extraterrestrial twin brother and sister superhero duo who first appeared in Hanna-Barbera's American animated television series *Super Friends*. They subsequently appeared in comics based on the animated series, and were later introduced into the main DC Comics Universe. They have since appeared in other media, including animated series such as *Justice League Unlimited* and *Teen Titans Go!*, and the live-action TV series *Smallville*.

Contents [hide]

Publication history [edit]

Wonder Twins



The Wonder Twins, from *Super Friends*.

Publication information	
First appearance	"Joy Ride" *The All-New Super Friends Hour* (September 10, 1977)
In-story information	
Alter ego	Zan and Jayna
Species	Exxorian
Place of origin	Exxor
Team affiliations	Super Friends Justice League Ten Elements of the Universe
Abilities	Zan can transform into any form of water Jayna can transform into any

The Wonder Twins of Angular 2 are

Components

RxJS Observables

They go together like Chocolate and Peanut Butter

He's Corny, Who is This Guy?

Ken Rimple - Director of Training, Chariot Solutions

- Long-time Java guy, Spring, now into JavaScript...
- Teaching and consulting at Chariot for 9+ years
- Author of various AngularJS courses at Chariot
- Co-author of Angular 2 and React courses at Chariot
- Father of 4 and inveterate bad punster

Where to find me

- On the tweeter at @krimple
- Chariot TechCast/DevNews podcast host
- Write articles at chariotsolutions.com/blog about JS frameworks and more

Angular 2 is

- A Component-based JavaScript Framework...
- girded by a ***Functional Reactive API***, Microsoft's ***RxJS 5.0***

What is a Component?

```
@Component({
  selector: 'message-area',
  template: `... html content here`,
  ...
})
export class MessageAreaComponent {
  constructor() { }
  message: string; // state variables
  doSomething() { ... } // user-defined methods
  ngOnInit() { ... } // lifecycle methods
}
```

You're never walking alone...

The application is bootstrapped with an outer component

A component in use by an *outer* component

```
// in the template of the outer component...

<message-area
  messageText="Don't walk and chew gum"
  [messageOptions]="messageOpts"
  (messageAccepted)="clearMessageText()">
</message-area>
```

- We'll look at each of these assignments...

Static assignment

```
messageText="Don't walk and chew gum"
enabled="true"
```

- Uses the `propertyName="value"` syntax, and expects literal values
- Used for simple options

Property binding

```
[propertyName]="variableOrExpression"
```

- Looks in the current component for a member variable or evaluates an expression
- The value is assigned ***by reference*** to the property `propertyName` in the inner component

Event Binding

```
(eventName)="methodCall()"
```

- When the `message-area` component emits the named event, execute the method `methodCall()` in the outer component

Differences from AngularJs 1.x?

(Tons)

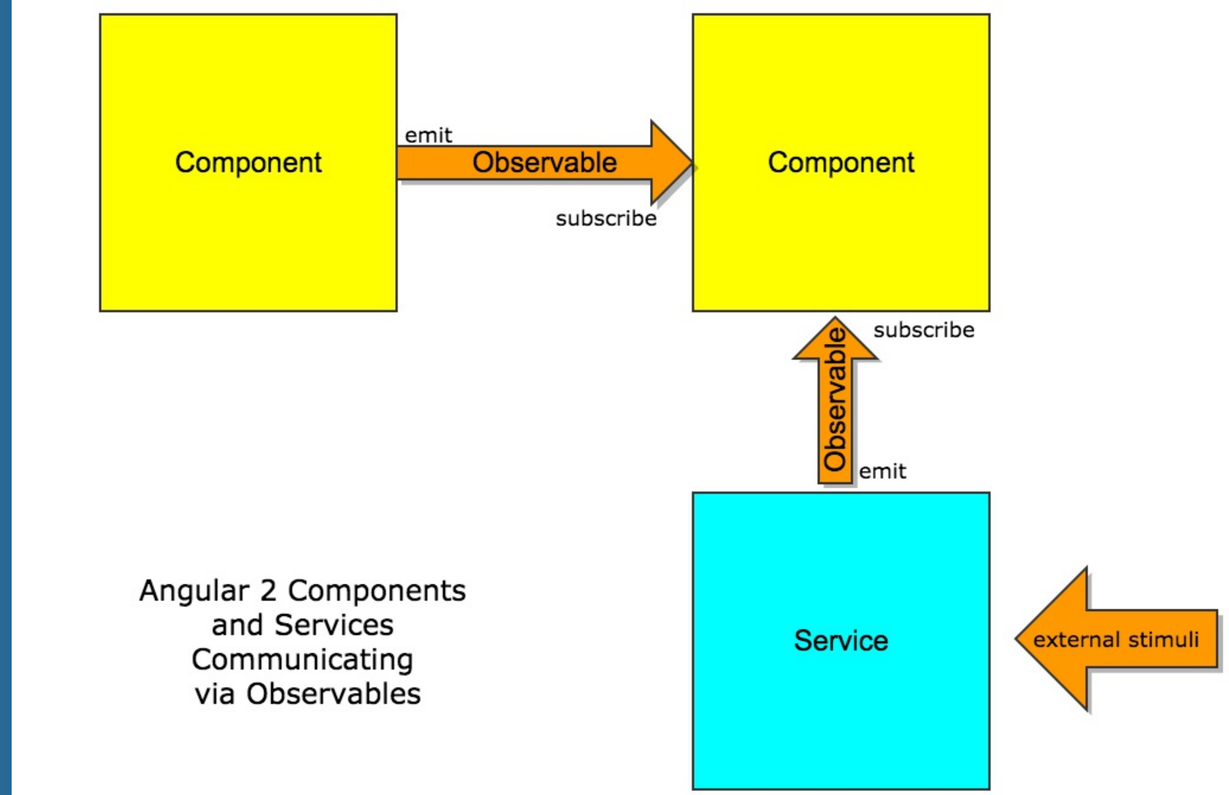
- No more `$scope`, `controller`
- Still have `Services`, though created differently
- Still have "filters" but they're called `Pipes` now
- Dependencies injected via constructor injection
- TypeScript classes instead of plain ES5
- The old message bus is replaced by RxJS
- Promises now use ES2015 Promise syntax or are replaced by RxJS observables

Component Demos

Components and Observables

What is an Observable?

- An abstraction in ***RxJS*** that can act as a ***data stream***
  - emits typed information
  - notifies subscribers when the information changes



This is a functional,
reactive framework,
enabled by Components
and RxJS...

Observables can be operated on functionally

- Compose streams of observable events
- Chain one operator to another
- Transform the stream to what you want
- Allow for more than one subscriber

Key Observable Type - Event Emitter

- Used in UI to report events from one component to another
- Bound using the `@Output` annotation

```
@Component({
  ...
})
export class ReportingComponent {
  @Output() onStatusChanged: EventEmitter<string> =
            new EventEmitter<string>();
}
```

Emitting an event

```
@Component({
    ...
    template: `
      <button (click)='emitEvent()'>go!</button>
    `
})
...
export class ReportingComponent {
   ...
   emitEvent() {
     this.onStatusChanged.emit('OUCH!');
   }
}
```

Accepting an emitted event

Inject `@Input` parameters using event syntax and subscribe in your code

```
in template:
<reporting
   (onStatusChanged)=
      "addStatusToHistory($event)">
</reporting>
```

Demo - emitting an event from an input field

Http API in Angular 1.x - Promise Based

```
// fetching data - API
return http.get('/api/customers')
  .then(
      (response) => { return response.data; }
  });

// caller
service.getData()
  .then((data) { this.data = data; });
```

Angular 2 Http API uses Observables

```
// fetching data - service
return http.get('/api/customers')
  .map((res) => { res.json() })

// fetching data - caller
service.getData().subscribe(
  (results) => {
    this.results = results;
  }
  (error) => { ...  });
```

Observable updates for Http

```
// updates
http.post('/api/customers', {})
  .then(
      () => { /* leave location */  },
      (error) => { /* show error */ });
```

Demo - REST

Key Observable Type - Subject

- Acts as an `Observable` and an `Observer`
- Meaning you can use it to emit events in a ***stream***
- Not tied to an UI component

```
// creating - stream of arrays of strings
let dataStream = new Subject<string[]>();

// emitting - send an array chunk
dataStream.next(['b', 'c', 'asdfkalsjdf']);

// subscribing
dataStream.subscribe(
    (payload) => { console.log(payload); },
    (error) => { alert('error with stream');},
    () => { console.log('stream closed'); });
```

Potential Subject Strategies

- Use as an adapter to translate data from another API
  - Midi Input
  - User-defined events
- Great to decouple sources and sinks of data
- Data is sent asynchronously
- Angular uses this internally
- Example in RxJS - Observable.webSocket

Demo - Synthesizer in Angular and RxJS

Advanced Features of Observables - Operators

- Observable streams can be composed and operated on with
  - Higher-order functions like `map`, `debounce`, `filter`, etc..
  - Dozens built-in to RxJS 5.0 - see Observable API for examples

Excellent reference

Summary

Angular 2 is Powerful

- But you need to learn Observables to make it reactive
- You need to master Components and `@Input` and `@Output` to communicate
- Look at each Angular API and learn how the Observables are used

Resources and Q&A

- Look on Twitter at @krimple for the slide deck and code samples later tonight
- Chariot's Angular and React training courses, as well as Scala chariotsolutions.com/training
- Ken's blog articles about Angular, as well as those from other Charioteers on Scala, React, Mobile and more - chariotsolutions.com/blog
- We have a PhillyETE video watching party coming up - chariotsolutions.com/events