Angular Master Class

Architecture

Component Communication

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- **ContentChildren/ViewChildren** - Injecting child components

Component Communication

There are different possible ways of communicating between components:

- **Inputs/Outputs** - Defining a well-defined API of what goes in and out a component
- **Dependency Injection** - Injecting parent components
- **ContentChildren/ViewChildren** - Injecting child components
- **Message Bus** - Implementing a pub/sub service to send and receive messages

Component Types

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Presentation Components

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Business Components

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Presentation Components

Business Components

View Components

Presentation Components

Presentation components characteristics:

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- Display the user interface

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- Display the user interface
- Independent of **business** logic (dumb)
- Data usually arrives via bindings (**inputs**)
- Data leaves via events (**outputs**)

Business Components

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- Access to business services & state (smart)

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- Access to business services & state (smart)
- Bound to specific use case
- Limited scope of reusability
- May depend on routing

View Components

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- Build the current view (from a URL)

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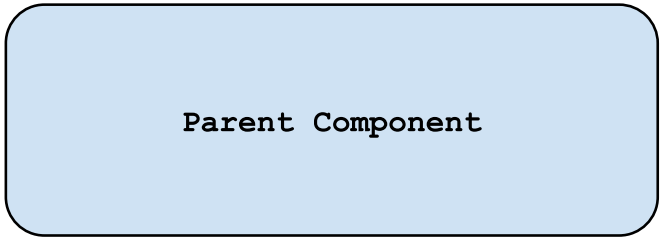
View Components

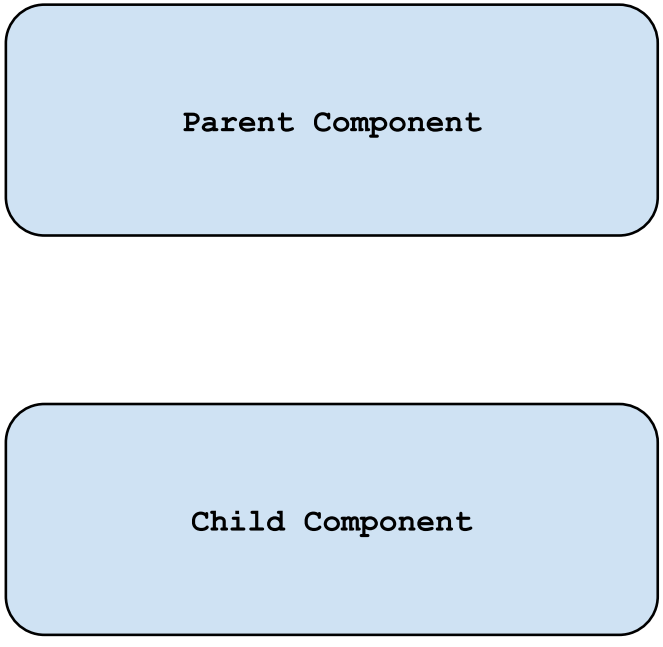
View components characteristics:

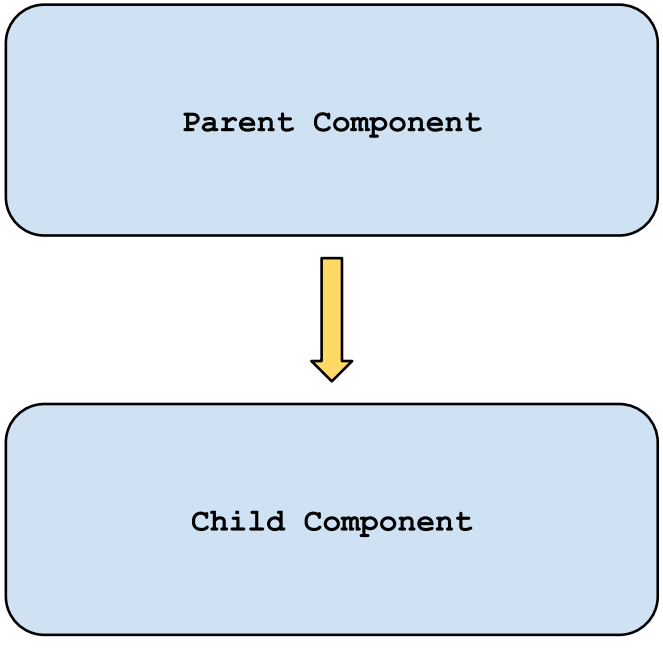
- Build the current view (from a URL)
- Always bound to a specific URL
- Composes other components to render UI
- Can be entry points to applications

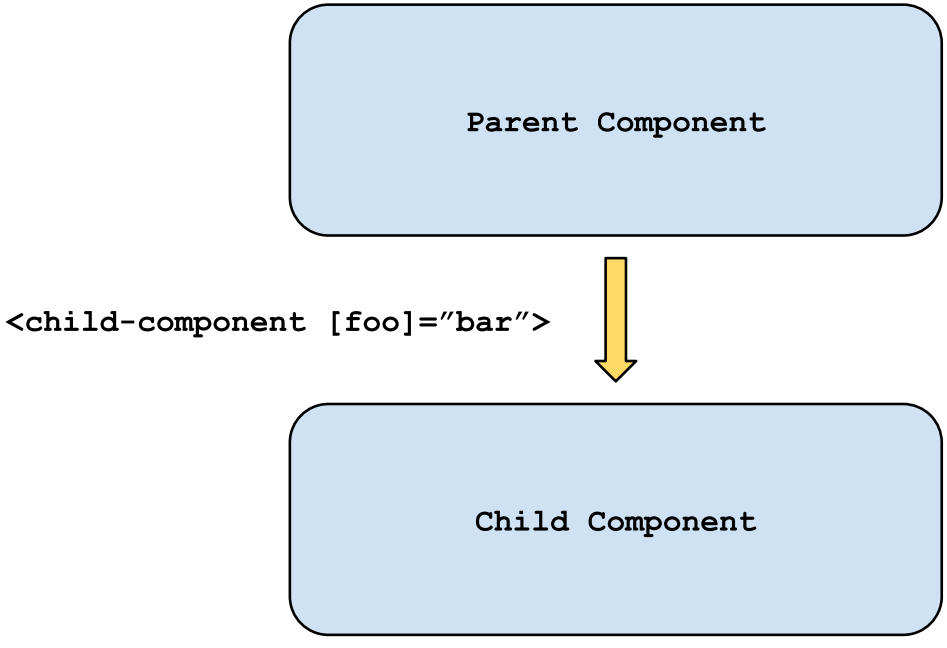
Inputs and Outputs

Inputs describe what **data flows into** a component.


Parent Component


Parent Component
Child Component


Parent Component
Child Component


Parent Component
<child-component [foo]="bar">
Child Component

Inputs using @Input()

We define component inputs using the **@Input** decorator.

```
import { Component, Input } from '@angular/core';

@Component({
  selector: 'trm-contacts-detail',
  template: 'This is {{contact.name}}'
})
export class ContactsDetailComponent {
  @Input() contact: Contact;
}
```

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import { Component, Input } from '@angular/core';

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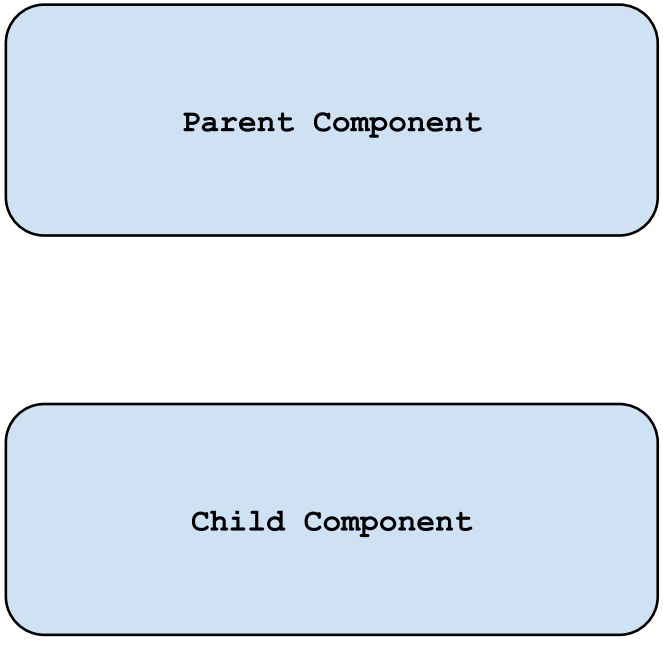
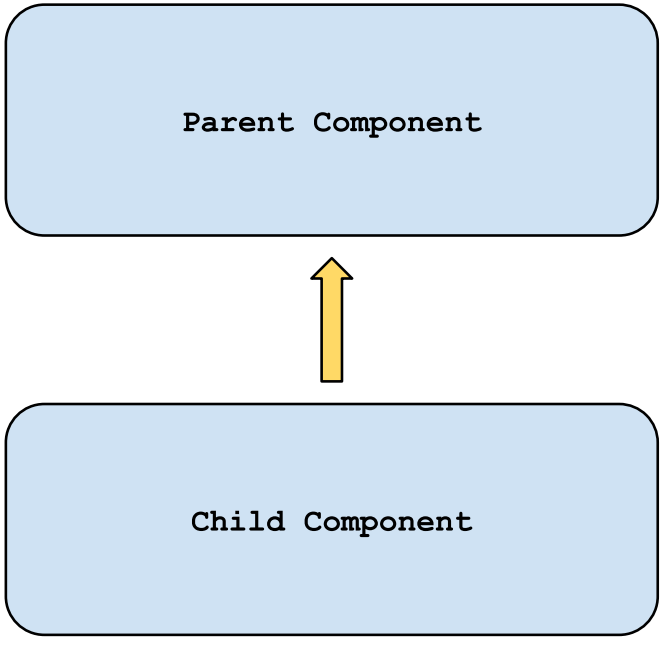
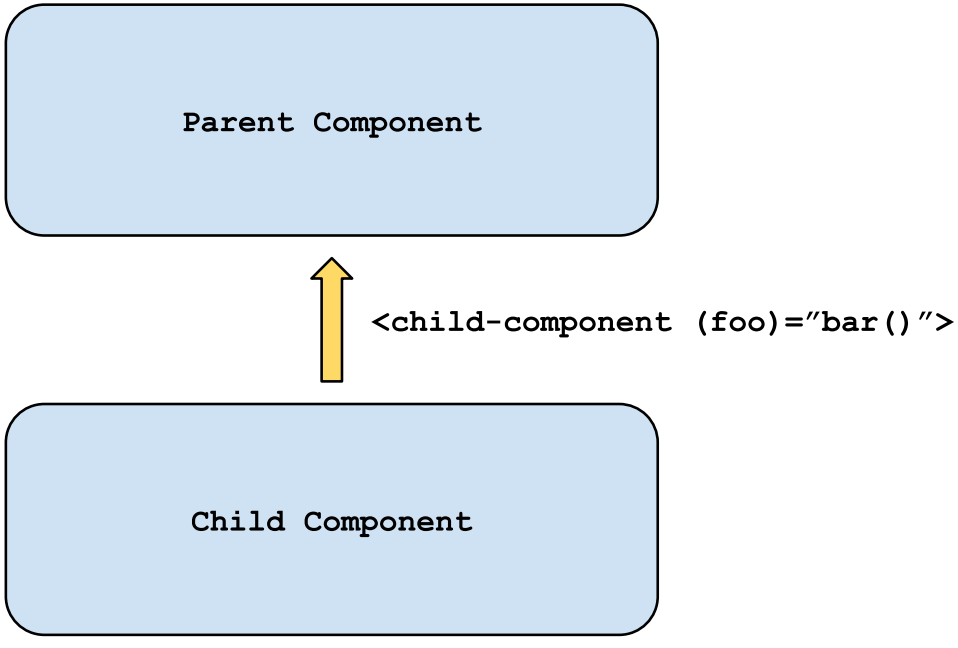
export class ContactsDetailComponent {
  @Input() contact: Contact;
}
```

Outputs describe what **data flows out** of a component.


Parent Component
Child Component


Parent Component
Child Component


Parent Component
<child-component (foo)="bar()">
Child Component

Outputs

Outputs are decorated with **@Output** and are **EventEmitter** instances.

```
import { Component, Input, Output } from '@angular/core';

@Component({
  selector: 'trm-contacts-detail',
  template: 'This is {{contact.name}}'
})
export class ContactsDetailComponent {
  @Input() contact: Contact;
  @Output() edit = new EventEmitter<Contact>();
}
```

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@Component({
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  template: 'This is {{contact.name}}'
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  @Input() contact: Contact;
  @Output() edit = new EventEmitter<Contact>();
}
```

Emitting custom events

We emit custom events using **EventEmitter.emit()** with an optional payload.

```
@Component({
  selector: 'trm-contacts-detail',
  template: `
    This is {{contact.name}}
    <button (click)="edit.emit(contact)">Edit</button>
  `
})
export class ContactsDetailComponent {
  @Input() contact: Contact;
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export class ContactsDetailComponent {
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Consuming custom events

We listen to custom events the same way we do to native events via event binding

```
<trm-contacts-detail
  [contact]="contact"
  (edit)="doSomething($event)">
</trm-contacts-detail>
```

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```
<trm-contacts-detail
  [contact]="contact"
  (edit)="doSomething($event)">
</trm-contacts-detail>
```

$event holds the optional payload emitted by the EventEmitter.

Exercise: Using Inputs and Outputs

t forget to git commit your solution

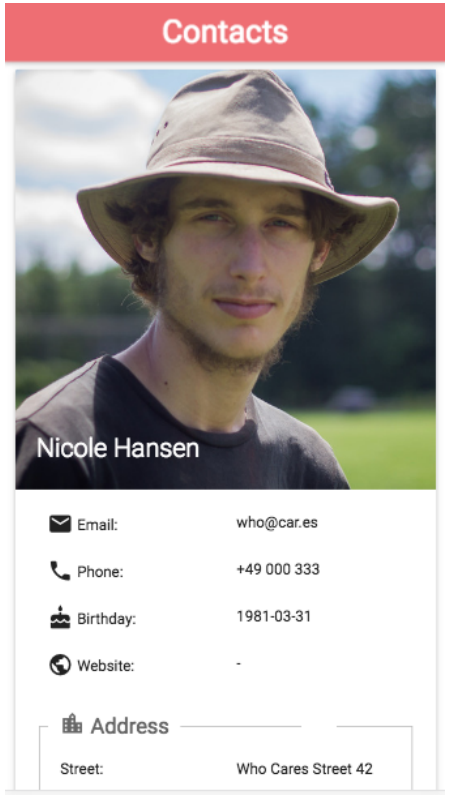
Injecting Parent Components

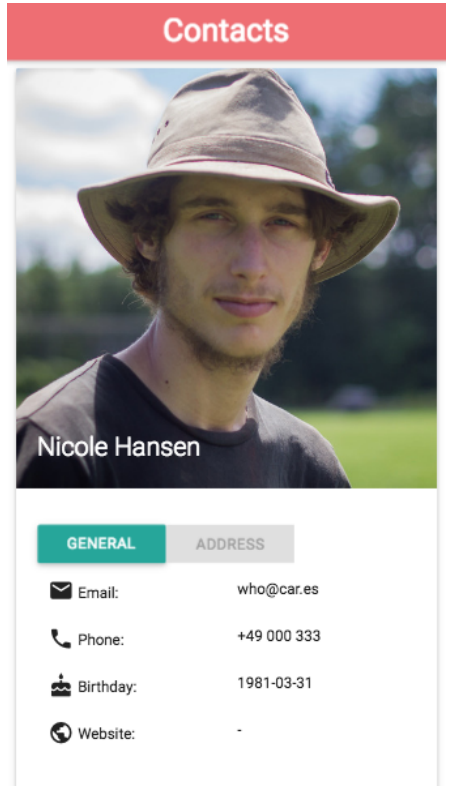
Contacts

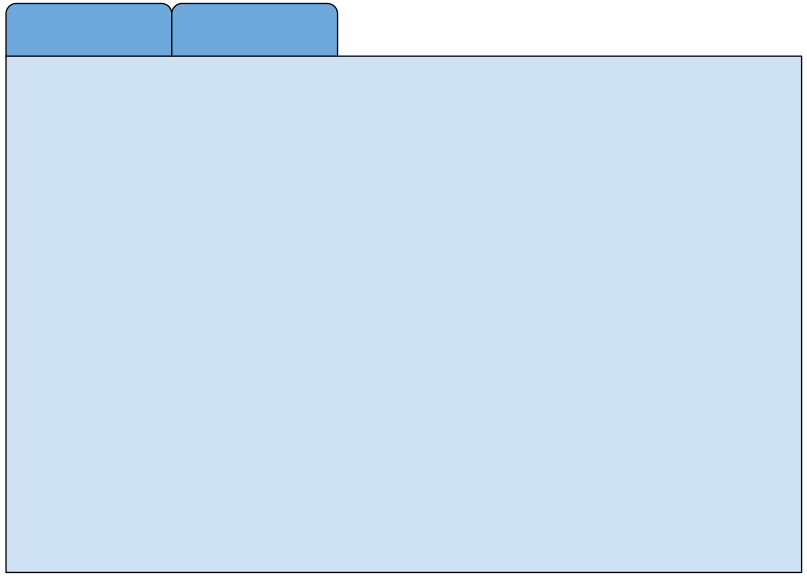
Email:	who@car.es
Phone:	+49 000 333
Birthday:	1981-03-31
Website:	-

Address

Street:	Who Cares Street 42


Contacts
Nicole Hansen
Email:
who@car.es
Phone:
+49 000 333
Birthday:
1981-03-31
Website:
-
Address
Street:
Who Cares Street 42


Contacts
Nicole Hansen
GENERAL
ADDRESS
Email:
who@car.es
Phone:
+49 000 333
Birthday:
1981-03-31
Website:
-



```
<tabs>
  <tab title="General">
    ...
  </tab>

  <tab title="Address">
    ...
  </tab>
</tabs>
```

```
@Component({ selector: 'tabs' })
class TabsComponent {}
```

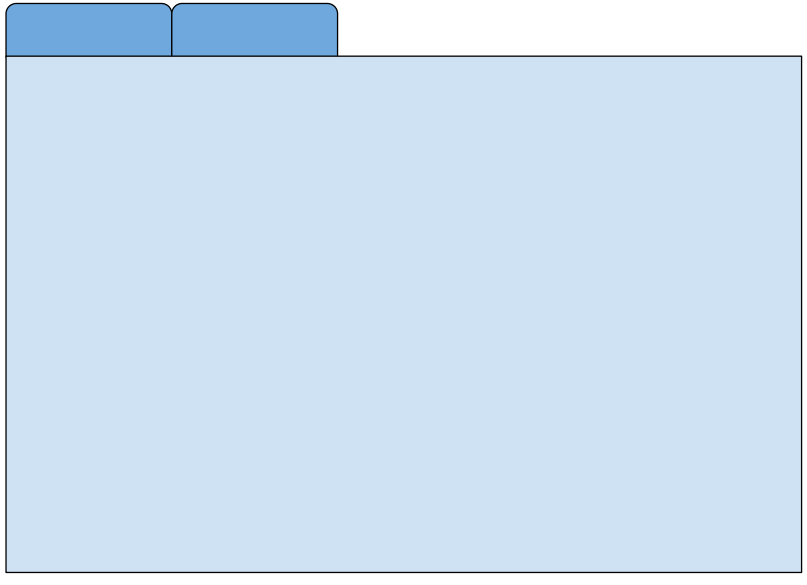
```
<tabs>
  <tab title="General">
    ...
  </tab>

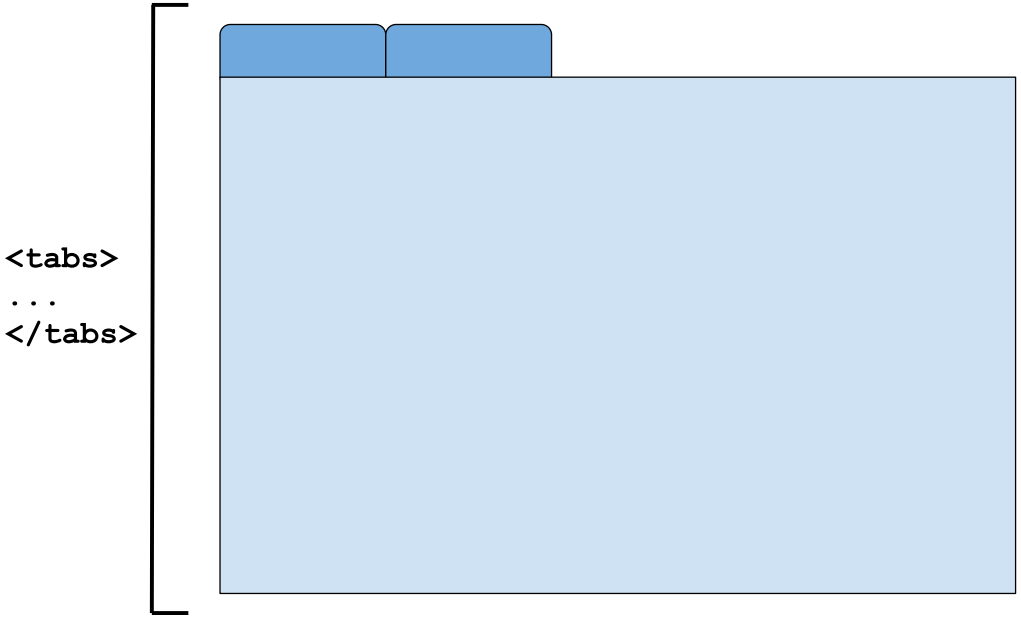
  <tab title="Address">
    ...
  </tab>
</tabs>
```

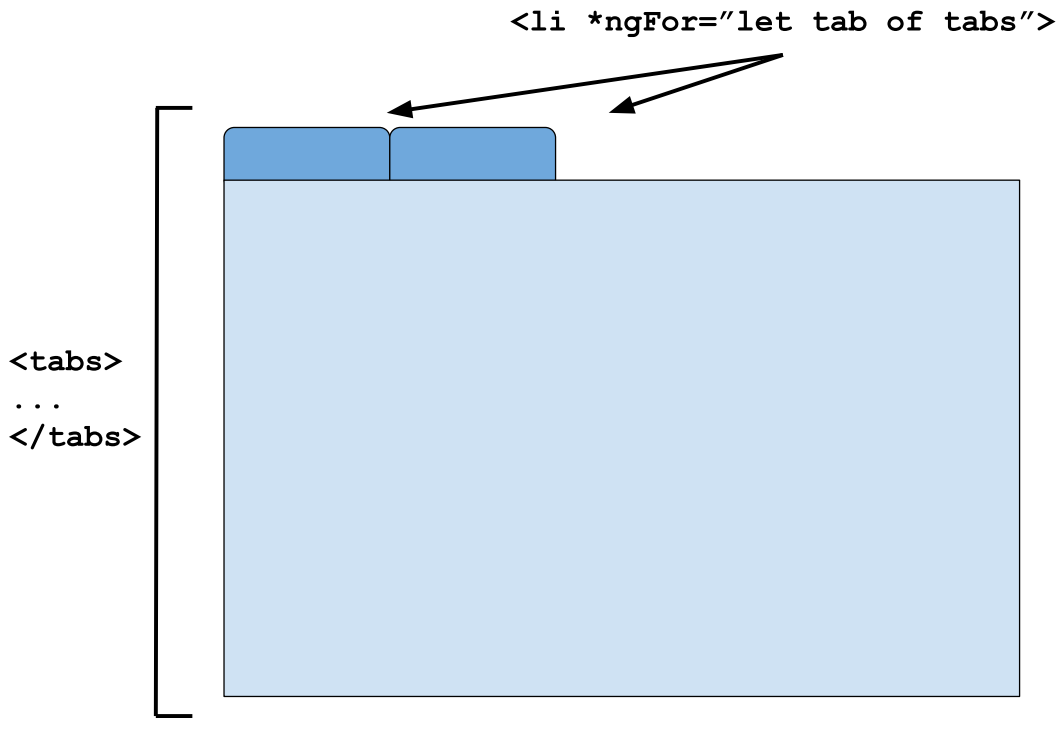
```
<tabs>
  <tab title="General">
    ...
  </tab>

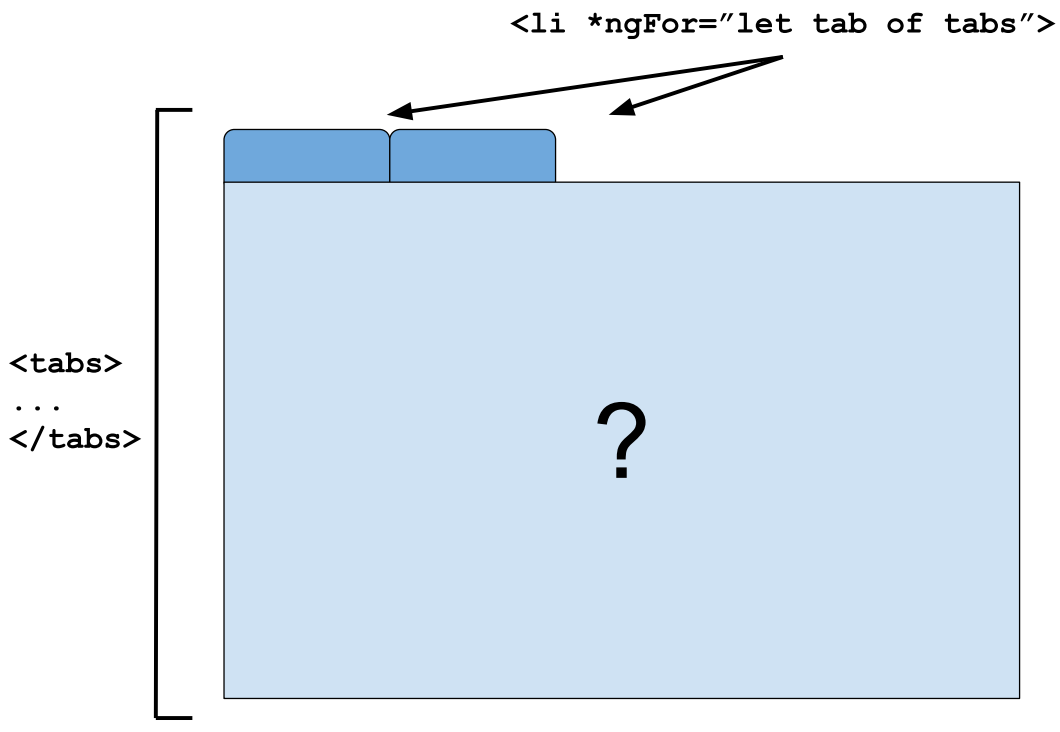
  <tab title="Address">
    ...
  </tab>
</tabs>
```

```
@Component({ selector: 'tab' })
class TabComponent {}
```




<tabs>
...
</tabs>


<li *ngFor="let tab of tabs">
<tabs>
...
</tabs>


<li *ngFor="let tab of tabs">
<tabs>
...
</tabs>
?

```
<tabs>
  <tab title="General">
    ...
  </tab>

  <tab title="Address">
    ...
  </tab>
</tabs>
```

Content Projection

We project a component's content using **<ng-content>**

```
@Component({
  selector: 'trm-tabs',
  template: `
    <div mat-tab-nav-bar>
      <button mat-tab-link
        *ngFor="let tab of tabs">...</button>
    </div>
    <ng-content></ng-content>
  `
})
class TabsComponent {}
```

Content Projection

We project a component's content using **<ng-content>**

```
@Component({
  selector: 'trm-tabs',
  template: `
    <div md-tab-nav-bar>
      <button md-tab-link
        *ngFor="let tab of tabs">...</button>
    </div>
    <ng-content></ng-content>
  `
})
class TabsComponent {}
```

How do we get access to child components?

Injecting Components

Dependency Injection allows us to inject **parent** component instances.

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```
@Component({
  selector: 'trm-tab'
})
class TabComponent implements OnInit {

  constructor(private tabs: TabsComponent) {}

  ngOnInit() {
    this.tabs.addTab(this);
  }
}
```

Injecting Components

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@Component({
  selector: 'trm-tab'
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  constructor(private tabs: TabsComponent) {}

  ngOnInit() {
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```

xercise: Building a Tabs component

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ContentChildren and ViewChildren

Injecting child components

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The following decorators give us access to component children:

- **@ContentChild()** - Query single content child
- **@ContentChildren()** - Query list of content children
- **@ViewChild()** - Query single view child
- **@ViewChildren()** - Query list of view children

What are **content children** and **view children**?

Content Children

Content children are the elements between the opening and closing tag of the host element of a given component (hence, **<ng-content>**).

```
<tabs>
  <tab title="General">
    ...
  </tab>

  <tab title="Address">
    ...
  </tab>
</tabs>
```

View Children

View Children are the elements located **inside** a component's view (template).

```
<ul>
  <li *ngFor="...">
    …
  </li>
<ul>
<ng-content></ng-content>
```

```
@Component({
  selector: 'trm-tabs'
})
class TabsComponent {



  tabs: Array<TabComponent>;
  ...




}
```

```
import { QueryList, AfterContentInit } from '@angular/core';

@Component({
  selector: 'trm-tabs'
})
class TabsComponent {

  @ContentChildren(TabComponent)
  tabs: QueryList<TabComponent>;
  ...




}
```

```
import { QueryList, AfterContentInit } from '@angular/core';

@Component({
  selector: 'trm-tabs'
})
class TabsComponent {

  @ContentChildren(TabComponent)
  tabs: QueryList<TabComponent>;
  ...




}
```

```
import { QueryList, AfterContentInit } from '@angular/core';

@Component({
  selector: 'trm-tabs'
})
class TabsComponent implements AfterContentInit {

  @ContentChildren(TabComponent)
  tabs: QueryList<TabComponent>;
  ...
  ngAfterContentInit() {

  }
}
```

```
import { QueryList, AfterContentInit } from '@angular/core';

@Component({
  selector: 'trm-tabs'
})
class TabsComponent implements AfterContentInit {

  @ContentChildren(TabComponent)
  tabs: QueryList<TabComponent>;
  ...
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  }
}
```
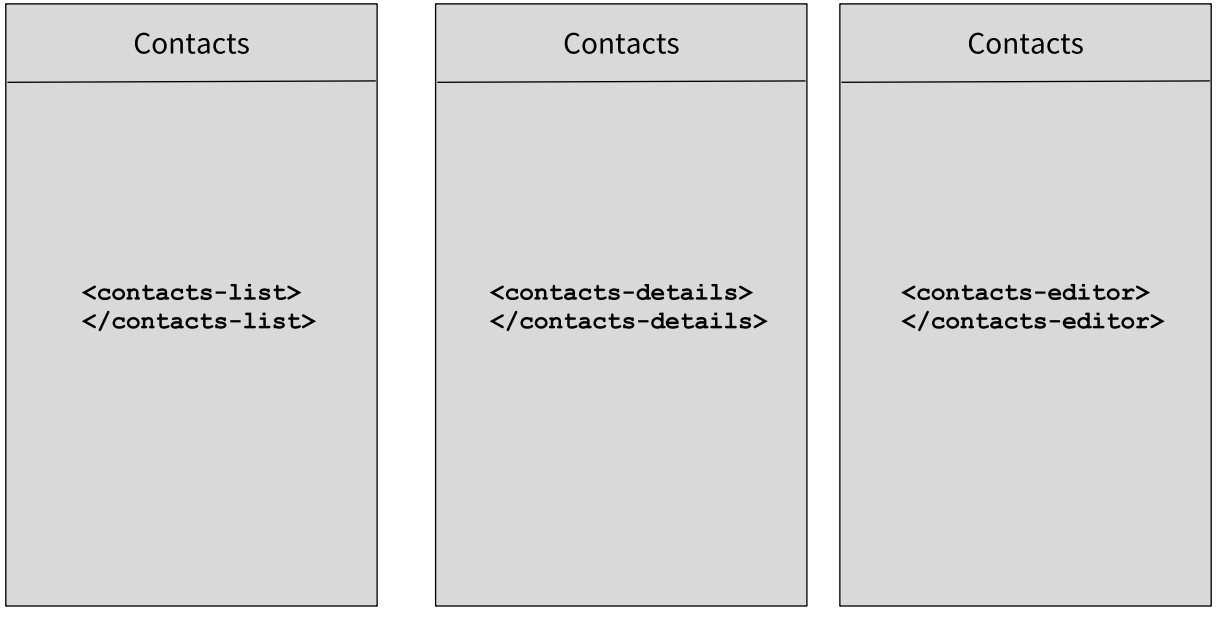
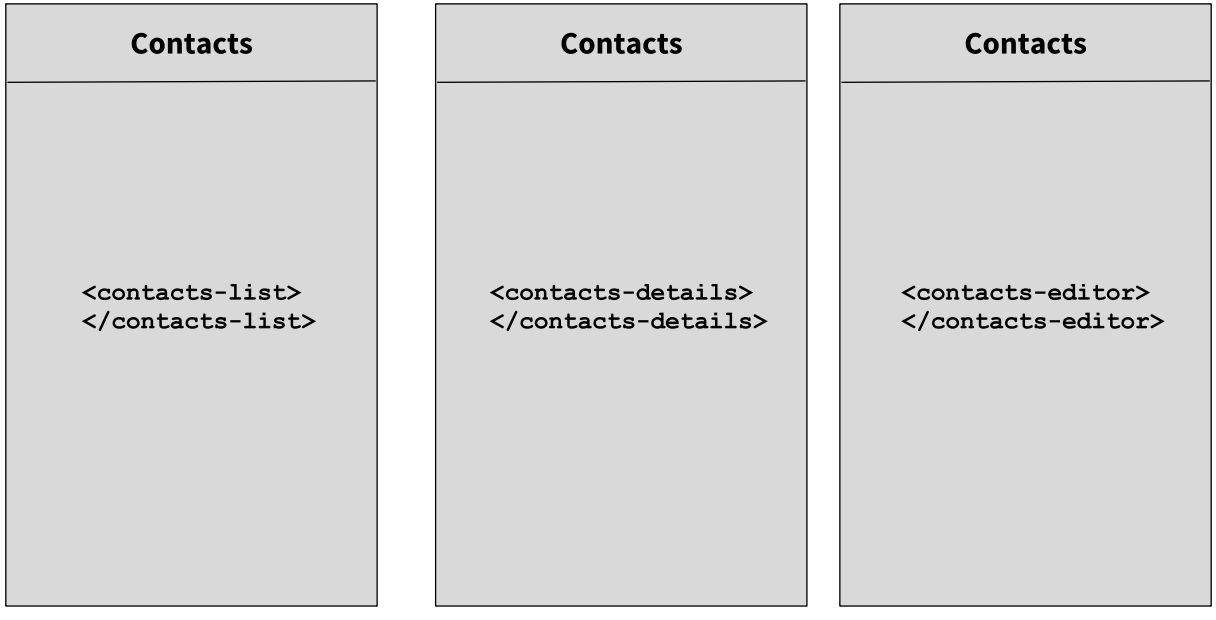

```
import { QueryList, AfterContentInit } from '@angular/core';

@Component({
  selector: 'trm-tabs'
})
class TabsComponent implements AfterContentInit {

  @ContentChildren(TabComponent)
  tabs: QueryList<TabComponent>;
  ...
  ngAfterContentInit() {
    this.selectTab(this.tabs.first);
  }
}
```

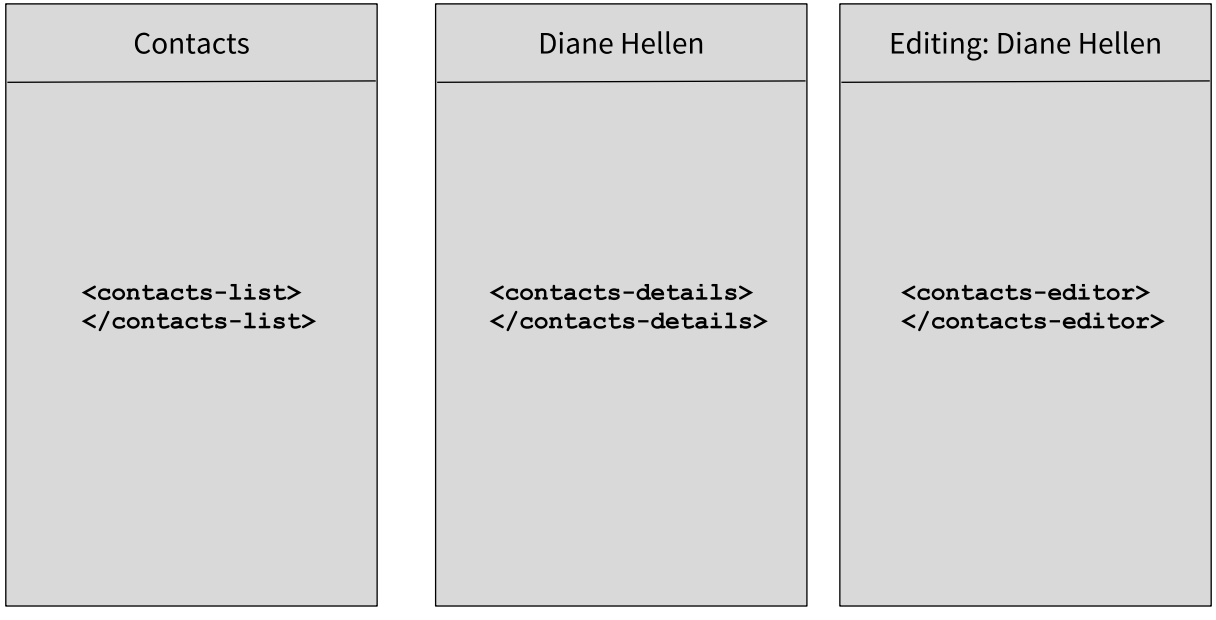
ercise: Refactor TabsComponent with ContentChildren

t forget to git commit your solution

Creating a custom EventBus


Contacts
<contacts-list>
</contacts-list>
Contacts
<contacts-details>
</contacts-details>
Contacts
<contacts-editor>
</contacts-editor>


Contacts
<contacts-list>
</contacts-list>
Contacts
<contacts-details>
</contacts-details>
Contacts
<contacts-editor>
</contacts-editor>


Contacts
<contacts-list>
</contacts-list>
Diane Hellen
<contacts-details>
</contacts-details>
Editing: Diane Hellen
<contacts-editor>
</contacts-editor>

The Problem

Currently, nothing updates the title when a view changes

```
@Component({
  selector: 'trm-contacts-app',
  template: `
    <mat-toolbar>Contacts</mat-toolbar>
    <router-outlet></router-outlet>
  `
})
class ContactsAppComponent {...}
```

Solving the problem

It turns out we can solve this problem in a simple way with the tools we already have:

- **Observable Service** - An event bus service that emits when something happened
- **Dependency Injection** - Inject the service where it needs to emit and subscribe

Creating an EventBus

Creating an EventBus

We can use a **Subject** to teach our service how to emit events

```
class EventBusService  {

  private _messages$ = new Subject<EventBusArgs>();









}
```

Creating an EventBus

We can use a **Subject** to teach our service how to emit events

```
class EventBusService  {

  private _messages$ = new Subject<EventBusArgs>();

  emit(eventType: string, data: any) {
    this._messages$.next({ type: eventType, data: data });
  }





}
```

Creating an EventBus

We can use a **Subject** to teach our service how to emit events

```
class EventBusService  {

  private _messages$ = new Subject<EventBusArgs>();

  emit(eventType: string, data: any) {
    this._messages$.next({ type: eventType, data: data });
  }

  observe(eventType: string) {
    return this._messages$.pipe(
      filter(args => args.type === eventType),
      map(args => args.data)
    );
  }
}
```

```
@Component({
  selector: 'trm-contacts-app',
  template: `
    <mat-toolbar>{{title}}</mat-toolbar>
    <router-outlet></router-outlet>
  `
})
class ContactsAppComponent {
  constructor(private eventBus: EventBusService) {}

  ngOnInit() {
    this.eventBus.observe('appTitleChange')
                 .subscribe(title => this.title = title);
  }
}
```

```
@Component({
  selector: 'trm-contacts-app',
  template: `
    <mat-toolbar>{{title}}</mat-toolbar>
    <router-outlet></router-outlet>
  `
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class ContactsAppComponent {
  constructor(private eventBus: EventBusService) {}

  ngOnInit() {
    this.eventBus.observe('appTitleChange')
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```

Exercise: Creating an EventBus

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THOUGHTRAM

EXTEND YOUR MEMORY

- git add .
- git commit -am "(completed) - architecture"
- git tag classroom/architecture