Redux

Managing Client State with Angular/React

MiQ Motivations

- Common client state management between Angular and React
- Consolidate client state into a common global store

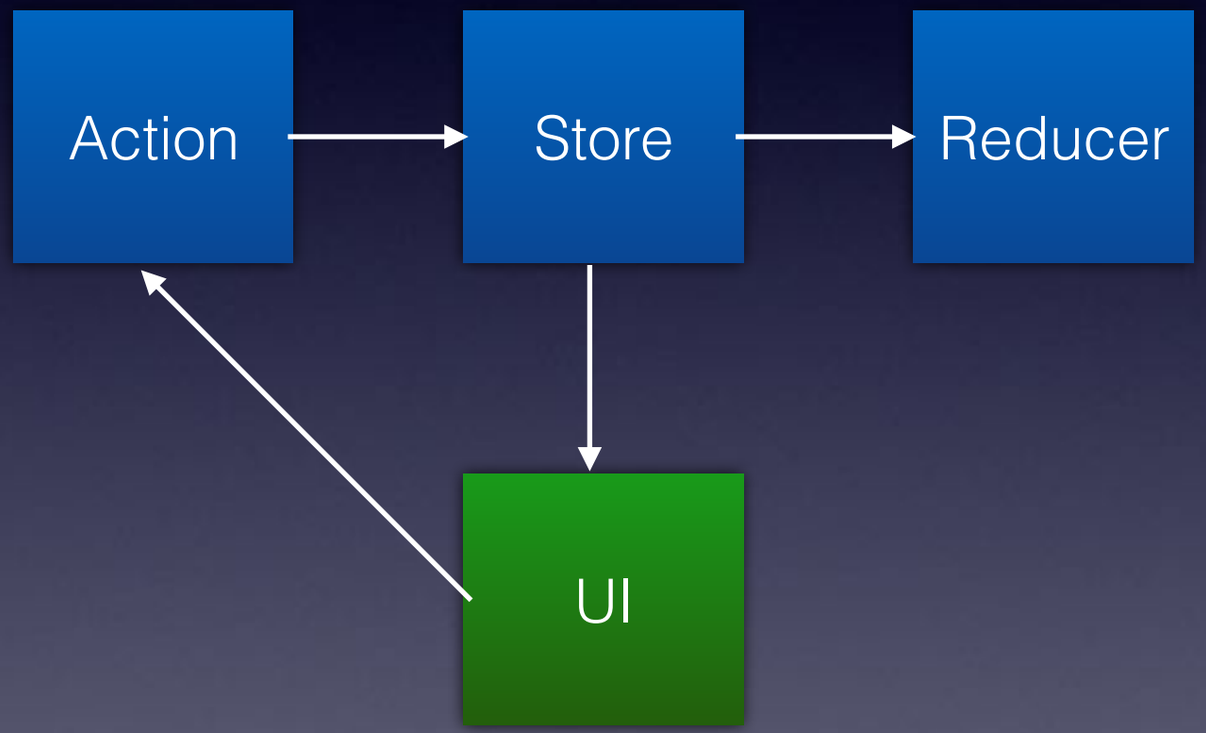
Components Downside

- Component architectures spawn distributed state in components - **everywhere — Component Spaghetti**
- Angular components only know about their **@input** passed into them
- This is further complicated by component mutation via events propagation (**@output EventEmitter**) at any time (async in no dependable order) - *leads to Heisenbugs*
- *After clicking around several screens we really don't know what state our application is in anymore (or every screen has to re-request everything to know we are consistent)*
- *New features introduce new Events which introduce unpredictable behavior for the UI*

Redux Key Concepts

- Immutable State Management
- Reducers are Pure functions (functional, no side effects)
- Reducers don’t change the state they return a new state: Reducer(state, action) -> Store
- Action is a type and optional payload
- State change is observed by subscribing to Observables (Rx.js)

Redux Key Concepts



Conceptual

- Conceptually the **store** can be pictured as a hierarchical tree of data. And any part of the tree can be subscribed to when it changes

Component Code

```
export class AppComponent {
  title = 'This is a sample app';
  @select counter;
  constructor(private ngRedux: NgRedux<IAppState>) {
  }
  increment() {
    this.ngRedux.dispatch({type: INCREMENT});
  }
}
```

```
<h1>
  {{title}}
</h1>
<p>Counter: {{counter | async}}</p>
<button (click)="increment()">Increment</button>
```

Store Code

```ts
export interface IAppState {
  counter: number;
}

export const INITIAL_STATE: IAppState = {
  counter: 0,
};

export function rootReducer(state, action): IAppState {
  switch (action.type) {
    case INCREMENT: return tassign(state, { counter: state.counter + 1});
  }
  return state;
}
```

How Can It Help

- UI Framework isolation via common *Actions* versus framework centric *Services*
- Consolidate distributed component state into a single immutable source
- Possible to serialize all or parts of the store to a DB or browser DB to resume that state from previous session

Pros

- Consistent application behavior
- Single source of truth (only one immutable **store,** *instead of lots of mutable components responding to events*)
- Performance, common data may not need to re-queried because its already available in the store
- Undo/Redo is simple
- Actions are simple data structures with no logic
- State is serializable and reproducible at any point

Cons

- Another Layer of code (more code/more moving parts)
- Normally not necessary to start out with Redux
- Different Mental Model to learn

Debugging

- Time Traveling Debugger (Awesome!)
    - Consistently reproduce your application state for any point in time
- QE can even dump the state.json to reproduce exact state of application when bug occurred
- Testing is much easier without the need for Mocks or spies

Is Redux Needed

- How much state does my application have and how many ways can that state be changed?
- How much data is shared among other views (think common headers/sidebars in different screens)

Angular 2+

- Angular 2+ has a tunable changed state detection mechanism

- Since we know some components don't internal state we can turn this off and get a huge performance boost by not checking changed components state since it is external to the component with Redux

- **changeDetectionStrategy.onPush** - Turns dirty checking off - ignore dirty checking until we have observed a new value from Redux

Implementations

- **ngRx/store** : Written as an Angular 2 implementation of Redux
- **ng2-redux** : Angular 2+ bindings for Redux. Uses Redux and is compatible with much of the Redux ecosystem. ***This is the implementation that we need to use for React/Angular integration.***
- Both use Rx.js
- Comparison: (*https://github.com/ngrx/store/issues/169*)

Summary

- Redux is a useful tool to consolidate client state management between different UI technologies (such as Angular/React)

- The Redux Architecture is a big win for **large** Angular applications by organizing state into a single source of truth

- Keeps the application state predictable

Resources

- https://github.com/ngrx

- https://github.com/angular-redux/store