



XState in React Native

How I finally managed to keep my views lean and my logic clean

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a bit about me:

- [@radiodario](#)
- Building [Anyone](#) - a Voice Networking App
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Unstable of Contents

1. The problem with apps
2. What are Finite State Machines
3. How does XState model FSMs
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Before we start, a lil' game

WRONG!

This is a photo of a typical react native project

WRONG!

This is a photo of a typical redux store after a year of active development by 3 frontend developers.

WRONG!

**This is just a photo of a bunch of cats sitting in
boxes**

!<--- pause for laughter --->

Face it, you make forms for a living.

**And making forms
shouldn't be that
hard**

**What do
these two
have in
common?**

Enter (Finite) State Machines

what is a Finite State Machine?

**he's literally reading out the Wikipedia definition
right now smh**

A litte bit about XState

- JS / TS finite state machines for modern apps
- by [@davidkpiano](#) et al.
- very active and lovely community ([discord](#))
- <https://statefy.ai/editor> <- visual editor also
- Really good VSCode Plugin
- Automatic typegen for machines



Modelling a my cat with XState


```
<iframe style="height: 100%;" src="https://state.ly.ai/viz/embed/040646b2-22db-4042-  
bc78-2a62225cc030?  
mode=viz&panel=code&showOriginalLink=1&readOnly=1&pan=0&zoom=0&controls=1  
" sandbox="allow-same-origin allow-scripts"></iframe>
```

```
<iframe style="height: 100%;" src="https://stately.ai/viz/embed/040646b2-22db-4042-  
bc78-2a62225cc030?  
mode=full&panel=code&showOriginalLink=1&readOnly=0&controls=1"  
sandbox="allow-same-origin allow-scripts"></iframe>
```

Anatomy of a Cat Machine

```
import { assign, createMachine } from "xstate";

const CatMachine = createMachine(
  {
    initial: "alive",
    context: {
      lives: 9, // the data that change accross "states"
    },
    states: {
      // the states we can be in
    },
  },
  { // these are the options - you don't need to define these here
    actions: {
      // -- named actions here*
    },
    services: {
      // -- services here
    },
    guards: {
      isDead: (ctx) => !ctx.lives,
    },
  }
);
```


States, events and transitions

```
states: {  
  alive: {  
    always: {  
      target: "dead",  
      cond: "isDead",  
    },  
    on: {  
      DIE: {  
        actions: ["diminishLives"],  
      },  
    },  
  },  
  dead: {  
    type: "final",  
  },  
}
```

States can be "nested" (child states)

```
alive: {  
  initial: "hungry",  
  states: {  
    hungry: {  
      entry: 'meow',  
      on: {  
        FEED: "disappointed",  
      },  
    },  
    asleep: {  
      invoke: {  
        src: 'sleep',  
        onDone: 'hungry',  
      }  
    },  
    disappointed: {  
      on: {  
        PET: "hungry",  
      },  
    },  
  },  
},  
}
```

Actions for side effects

```
actions: {  
  meow: () => {  
    console.log('meow');  
  },  
  diminishLives: assign({  
    lives: (ctx) => ctx.lives - 1,  
  }),  
}
```

Machine Context

aka your *infinite* "states"

```
context: {  
  lives: 9,  
  mood: 'disappointed',  
  awokenAt: new Date(),  
},
```

`assign` is an action lets you assign values to the context:

```
actions: {  
  diminishLives: assign({  
    lives: (ctx, ev) => ctx.lives - 1,  
  }),  
}
```

Services (soon to be renamed to Actors)

~~Services~~ Actors model long running processes

```
{
  asleep: {
    invoke: {
      src: 'sleep',
    },
  },
}, {
  services: {
    sleep: async (ctx, ev) => {
      return await DigestiveSystem.digest(ctx.food);
    },
  }
}
```

Invoking ~~services~~ Actors

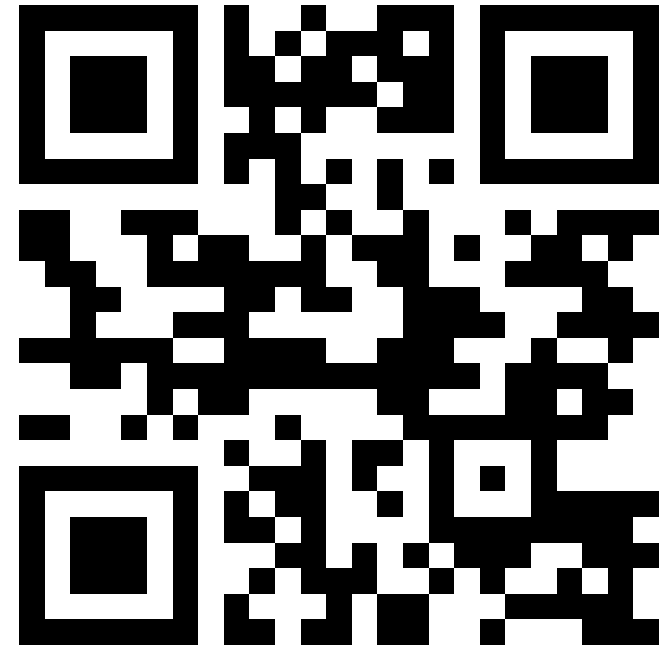
```
asleep: {  
  invoke: {  
    id: 'sleep', // an id of your service  
    src: 'sleep', // the name of your service in machine opts  
    onDone: {  
      // what to do when your service finishes  
      // aka your promise returns  
      target: 'hungry',  
    },  
    onError: {  
      // error handling  
      target: 'sick',  
    },  
  },  
},  
,
```

Guards - for conditional Transitions

```
guards: {  
  isDead: (ctx: CatContext) => ctx.lives === 0,  
  isHungry: () => true,  
}
```

READ THE DOCS

👉 here 👈



Integrating with React Native

Wrap your flow in a context

```
const CatMachineContext = React.createContext<InterpreterFrom<typeof CatMachine>>>();

function MyCat = () => {

  const catMachine = useInterpreter(CatMachine, {
    actions: {
      meow: (ctx, ev) => console.log("Meow");
    },
    services: {
      ...
    }
  })

  return (
    <CatMachineContext.Provider value={catMachine}>
      ...
    </CatMachineContext.Provider>
  )
}
```

Add a navigator

```
const CatFlowStack = createNativeStackNavigator<CatFlowParamList>();

function CatFlow = () => {

  const catMachine = useInterpreter(CatMachine, {...});

  return (
    <CatMachineContext.Provider value={catMachine}>
      <CatFlowStack.Navigator>
        <CatFlowStack.Screen name="Hungry" component={HungryScreen} />
        <CatFlowStack.Screen name="Asleep" component={AsleepScreen} />
        <CatFlowStack.Screen name="Disappointed" component={DisappointedScreen} />
        <CatFlowStack.Screen name="Dead" component={DeadScreen} />
      </CatFlowStack.Navigator>
    </CatMachineContext.Provider>
  )
}
```

Grab your cat by the context:

```
const HungryScreen = () => {  
  
  const catService = useContext(CatMachineContext);  
  
  // subscribe only to what you need  
  const livesRemaining = useSelector(catService,  
    current => current.context.lives,  
  );  
  
  return (  
    <View>  
      <Text>{livesRemaining} lives</Text>  
      <Image src="@assets/hungry-cat" />  
      <Button onPress={() => cat.send('FEED')} />  
    </View>  
  )  
};
```

Use a hook to navigate by subscribing to state

```
const useHandleNavigation = () => {
  const catService = useContext(CatMachineContext)
  const navigation = useNavigation();

  useEffect(() => {
    const subscription = catService.subscribe((state) => {
      if (state.matches("alive.asleep")) {
        navigation.navigate('Asleep');
      }
      if (state.matches("alive.disappointed")) {
        navigation.navigate('Disappointed');
      }
      // ... etc
    });
    return subscription.unsubscribe;
  }, [catService, navigation]);
}
```

You get many things for free

```
const catService = useContext(MyStateMachineContext)
const [currentState, send] = useActor(catService)

// `can` will evaluate to true if the current state has any
// valid transitions in the current state for that event

<Button disabled={currentState.can('FEED')} />

// you can show a spinner for long running services
const isAsleep = useSelector(catService,
  current => current.matches('alive.asleep')
);

return (isAsleep && <Spinner>)
```

Some things to keep in mind

- Fast refresh breaks if you change the state machine definition `;_;`
- Name your actions/services/guards, trust me.
- Keep state / context lean.
- If you listen to the whole machine state on views that are mounted, the views will re-render
- prefer `useSelector` to `useActor` and grab only what you need from your context / state
- `nativeStackNavigator -> freezeOnBlur: true` `screenOption`

```
<!-- Intermezzo --->
```


Why do XState:

- Separates your logic and services from your view layer.
- Keeps views short and clean
- Reusable services / actions - swap out logic for mocks in tests
- Do Model Based Testing (*it's mental*)
- Rearranging flows / moving things around is easy - just modify the transitions
- Complex flows and logic doesn't mean complex views.
- Flipper Plugin `react-native-flipper-xstate`

Why dont I just use

(redux | jotai | zustand | useReducer | immer | \$library) ?

- do whatever floats your boat idgaf

- You can use `$your_library_here` and interop via side effects (actions!)
- Forces you think of all the states of your app / flow
- State vs Context
- A good UX designer will have made a UI flow on figma that will look a bit like a FSM
- Try it for one flow/feature in your app and see how you do

When should I not use a FSM

- When the potential number of states is *infinite*
- When there are very few states

A real life specimen of Anyone Post-call review machine

References and further reading

- [Finite State Machines \(pdf\) - David Wright](#)
- [State machines are wonderful tools - Chris Wellons](#)
- [Rage Against the Finite-State Machines](#)
- [Integrating XState with React Native and React Navigation - Simone D'Avico](#)

Question Time

slides 📱

