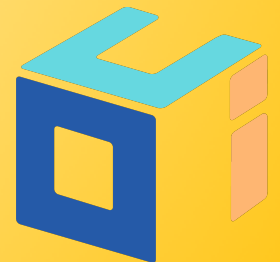




Svelte - Web App Development Reimagined

slides at <https://github.com/mvolkmann/talks>

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OCI | TRAINING

What Is Svelte?

- Alternative to web frameworks like React, Vue, and Angular
- A web application **compiler**, not a runtime library
 - compiles `.svelte` files to a single JavaScript file
 - no Svelte runtime **dependencies**, only **devDependencies**
- Doesn't use a virtual DOM
- Developed by **Rich Harris**
 - formerly at "The Guardian"; currently at "The New York Times"
 - previously created **Ractive** web framework - <https://ractive.js.org/>
 - used at "The Guardian"
 - inspired parts of Vue
 - created **Rollup** module bundler - <https://rollupjs.org/>
 - alternative to Webpack and Parcel

What is SvelteKit?

- Framework on top of Svelte that replaces Sapper
 - Like Next for React or Nuxt for Vue
 - Features
 - file-based page routing
 - file-based endpoints (REST services)
 - layouts
 - ex. common page header, footer, and nav
 - error page
 - code splitting for JS and CSS
 - page visits only load the JS and CSS they need
 - hot module reloading (HMR)
 - provided by Vite; very fast!
 - static pages and sites
- setup of TypeScript
 - setup of Sass or Less CSS preprocessors
 - setup of ESLint
 - setup of Prettier
 - adapters for deployment targets
 - currently node, static, begin, netlify, and vercel
 - to change, modify `svelte.config.cjs`

Important files and directories:

`src/app.html` - starting HTML file
`src/routes` - holds page components and endpoints
`src/lib` - holds other components and functions
`build` - holds files generated by `npm run build`

Config files:

`.eslintrc.cjs`
`.prettierignore`
`.prettierrc`
`jsconfig.json`
`package.json`
`svelte.config.cjs`

Creating a SvelteKit Project

- Install Node.js
- `npm init svelte@next [project-name]`
 - omit `project-name` to create in current directory
 - asks these questions
 - Use TypeScript in components? defaults to no
 - What do you want to use for writing Styles in Svelte components? CSS (default), Less, or SCSS
 - Add ESLint for code listing? defaults to no
 - Add Prettier for code formatting? defaults to no
 - outputs instructions for next steps
- `cd project-name`
- `npm install`

sets `useTabs` to true and `printWidth` to 100

```
.prettierrc
{
  "arrowParens": "avoid",
  "bracketSpacing": false,
  "printWidth": 80,
  "singleQuote": true,
  "trailingComma": "none",
  "useTabs": false
}
```

my preferred settings

```
.eslintignore
build/
```

create this file

Running a SvelteKit Project

- `npm run lint` to run ESLint
- `npm run format` to run Prettier
- `npm run dev` to run in development mode
 - provides watch and live reload
 - options go after `--`
 - to open in default browser add `--open` or `-o`
 - to specify port add `--port #` or `-p #` (defaults to 3000)
- `npm build` to build for deployment
 - creates files in `build` directory that should be deployed

An Example

- Since you are all experienced web developers,
let's look at an example app
so you can **compare** the look of the code
to your current favorite web framework
- On to the classic ... todo app!
- Code at
 - <https://github.com/mvolkmann/sveltekit-todo>
 - <https://github.com/mvolkmann/sveltekit-todo-w-endpoints>

Todo App ...

To Do List

1 of 2 remaining Archive Completed

Add

☒ ~~learn Svelte~~ Delete

☐ build a Svelte app Delete

a Todo component

... Todo App ...

src/lib/ToDo.svelte

```
1 <script>
2   import {createEventDispatcher} from 'svelte';
3   import {fade} from 'svelte/transition';
4   const dispatch = createEventDispatcher();
5   export let todo; // the only prop
6 </script>
7
8 <li transition:fade>
9   <input
10     type="checkbox"
11     checked={todo.done}
12     on:change={ () => dispatch('toggleDone')}
13   />
14   <span class:done={todo.done}>{todo.text}</span>
15   <button on:click={ () => dispatch('delete')}>Delete</button>
16 </li>
17
18 <style>
19   .done {
20     color: gray;
21     text-decoration: line-through;
22   }
23   li {
24     margin-top: 5px;
25   }
26 </style>
```

script and
style sections
are optional

export makes it a prop

interpolation

What is the name of this component?
Can't tell.
Names are assigned when other
components import this one.

... Todo App ...

```
1 <script>
2   import Todo from '../lib/Todo.svelte';
3
4   let lastId = 0;
5   const createTodo = (text, done = false) => ({id: ++lastId, text, done});
6
7   let todoText = '';
8   let todos = [
9     createTodo('learn Svelte', true),
10    createTodo('build a Svelte app')
11  ];
12
13  $: uncompletedCount = todos.filter(t => !t.done).length;
14  $: status = `${uncompletedCount} of ${todos.length} remaining`;
15
16  function addTodo() {
17    todos = todos.concat(createTodo(todoText));
18    todoText = '';
19  }
20
21  const archiveCompleted = () => todos = todos.filter(t => !t.done);
22
23  const deleteTodo = todoId => todos = todos.filter(t => t.id !== todoId);
24
25  function toggleDone(todo) {
26    const {id} = todo;
27    todos = todos.map(t => t.id === id ? {...t, done: !t.done} : t);
28  }
29 </script>
```

src/routes/index.svelte

Top-level variables ARE the component state if used in HTML!
When state changes, only the relevant part of DOM are updated.

reactive
declarations

No methods,
just functions.

Not really archiving in this
simple implementation,
just deleting.

No this anywhere,
just plain functions!

... Todo App

```
1 <div>
2   <h2>To Do List</h2>
3   <div>
4     {status}
5     <button on:click={archiveCompleted}>Archive Completed</button>
6   </div>
7   <form on:submit|preventDefault={addTodo}>
8     <input
9       type="text"
10      size="30"
11      autofocus
12      placeholder="enter new todo here"
13      bind:value={todoText}
14    />
15    <button disabled={!todoText}>Add</button>
16  </form>
17  <ul>
18    {#each todos as todo}
19      <Todo
20        {todo}
21        on:delete={ () => deleteTodo (todo.id) }
22        on:toggleDone={ () => toggleDone (todo) }
23      />
24    {/each}
25  </ul>
26 </div>
```

src/routes/index.svelte

binds value of form element to a variable;
simulates two-way data binding;
provides current value and
event handling for updating variable
when user changes value

Mustache-style markup

... Todo App ...

```
1 <style>                                     src/routes/index.svelte
2   button {
3     margin-left: 10px;
4   }
5
6   h2 {
7     margin-top: 0;
8   }
9
10  /* This removes bullets from a bulleted list. */
11  ul {
12    list-style: none;
13    margin-left: 0;
14    padding-left: 0;
15  }
16 </style>
```

Top Svelte Features

- It's fast!
 - see <https://krausest.github.io/js-framework-benchmark/current.html>
 - can select frameworks to compare
- Small bundle sizes
- File-based component definitions
- CSS scoped by default
- Clear place to put global CSS
- Easy component state management (reactivity)
- Reactive statements (\$:)
- Two-way data bindings
- Built-in animations
- Easy app state management (stores) We haven't seen this yet.

Small Bundle Sizes



- Delivered code is much smaller, so loads faster in browsers
- Create production build with `npm run build`
- A RealWorld Comparison of Front-End Frameworks with Benchmarks
 - <https://medium.com/dailyjs/a-realworld-comparison-of-front-end-frameworks-2020-4e50655fe4c1>

Gzipped App Size in KBs

Angular+ngrx: 694
React+Redux: 193
Vue: 71
Svelte: 15

Lines of Code

Angular+ngrx: 4210
React+Redux: 2050
Vue: 2076
Svelte: 1057

Easy Component State Mgmt.

("reactivity")

- Changes to top-level variables referenced in interpolations automatically cause those interpolations to be reevaluated
- Example

```
<script>
  let count = 0;
  const increment = () => count++;
</script>

<div>count = {count}</div>
<button on:click={increment}>+</button>
```

- Must assign a new value to trigger
 - pushing new elements onto an array doesn't do this

```
myArr = myArr.concat(newValue);
```

works

```
myArr = [...myArr, newValue];
```

works

```
// Alternative trick
myArr.push(newValue);
myArr = myArr;
```

works

Reactive Statements

a.k.a. "destiny operator"

- `$:` is a "labeled statement" with label name "`$`" that Svelte treats as a "reactive statement"
- Add as a prefix on top-level statements that should be repeated whenever any referenced variables change

Labeled statements can be used as targets of `break` and `continue` statements. It is not an error in JavaScript to use same label more than once in same scope.

- Examples

```
$: average = total / count;  
$: console.log('count =', count);
```

like "computed properties" in Vue

great for debugging

When applied to an assignment to an undeclared variable it is called a "reactive declaration" and the `let` keyword is not allowed.

- Can apply to a block

```
$: {  
  // statements to repeat go here  
}
```

- Can apply to multiline statements like `if` statements

```
$: if (someCondition) {  
  // body statements  
}
```

re-evaluates condition if any variables it references change, and executes body only when true

Loan Example

```
1 <script>
2   let interestRate = 3;
3   let loanAmount = 200000;
4   let years = 30;
5   const MONTHS_PER_YEAR = 12;
6
7   $: months = years * MONTHS_PER_YEAR;
8   $: monthlyInterestRate = interestRate / 100 / MONTHS_PER_YEAR;
9   $: numerator = loanAmount * monthlyInterestRate;
10  $: denominator = 1 - (1 + monthlyInterestRate) ** -months;
11  $: payment =
12    !loanAmount || !months ? 0 :
13    interestRate ? numerator / denominator :
14    loanAmount / months; // no interest
15 </script>
16
17 <label for="loan">Loan Amount</label>
18 <input id="loan" type="number" bind:value={loanAmount} />
19
20 <label for="interest">Interest Rate</label>
21 <input id="interest" type="number" bind:value={interestRate} />
22
23 <label for="years">Years</label>
24 <input id="years" type="number" bind:value={years} />
25
26 <div>
27   Monthly Payment: ${payment.toFixed(2)}
28 </div>
```

Loan Amount

200000

Interest Rate

3

Years

30

Monthly Payment: \$843.21

Easy App State Mgmt.

- “Stores” hold application state outside any component
- Alternative to using props or “context” to make data available in components
- Where to define?

- for stores that should be available to any component, define and export them in a file like `src/stores.js` and import them from that file wherever needed

```
stores.js
import {writable} from 'svelte/store';
export const dogStore = writable([]);
```

initial value

- for stores that should only be available to descendants of a given component, define them in that component and pass them to descendants using props or context

```
<script>
  import {dogStore} from './stores.js';
</script>

<!-- Use $dogStore in HTML. -->
```

uses auto-subscription

Issues to Consider

- **Popularity**

- perhaps Svelte is now considered the #4 most popular approach for building web apps
- isn't yet easy to find developers that already know it
- but it's very easy to learn and there is less to learn than other approaches

- **Component libraries**

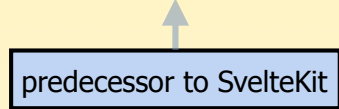
- fewer available than for other frameworks, but perhaps enough for your app
- just a matter of time for more to arrive

- **Cannot generate HTML in functions**

- encourages creating additional `.svelte` files in cases where React would use functions that return JSX

Svelte Resources

- **“Rethinking Reactivity” talk by Rich Harris**
 - delivered multiple times, most recently at “Shift Conference” June 20, 2019
 - explains issues with using virtual DOM (like React and Vue) and motivation for Svelte
- **Home page** - <https://svelte.dev>
 - contains **Tutorial**, **API Docs**, **Examples**, online **REPL**, **Blog**, and **Sapper** link
 - REPL is great for trying small amounts of Svelte code
 - REPL can save for sharing and submitting issues
- **SvelteKit** - <https://kit.svelte.dev>
- **GitHub** - <https://github.com/sveltejs/svelte>
- **Svelte Community** - <https://github.com/sveltejs/community>
 - “contains data for Svelte meetups, packages, resources, recipes, and showcase websites”
- **Discord chat room** - <https://discordapp.com/invite/yy75DKs>

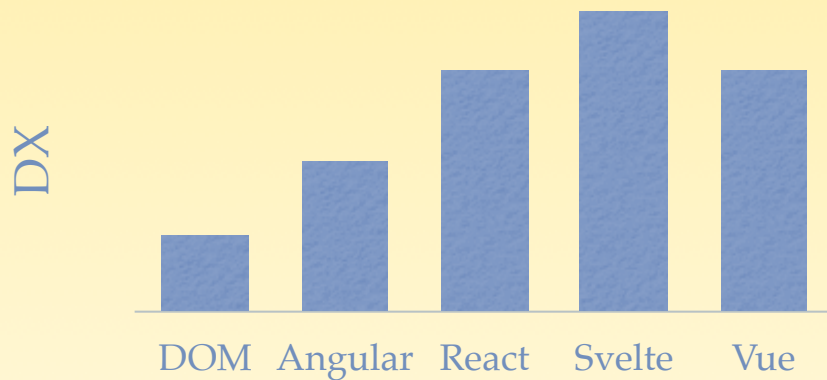


predecessor to SvelteKit

The diagram consists of a light blue rectangular box with a black border containing the text 'predecessor to SvelteKit'. A light blue arrow points upwards from the top center of this box to the word 'Sapper' in the list item above it.

Conclusion

- **Svelte is a worthy alternative** to React, Vue, and Angular



UX is similar for all,
but built-in animations in Svelte
may encourage their use.

- Check out **my book**
 - <https://www.manning.com/books/svelte-and-sapper-in-action>

