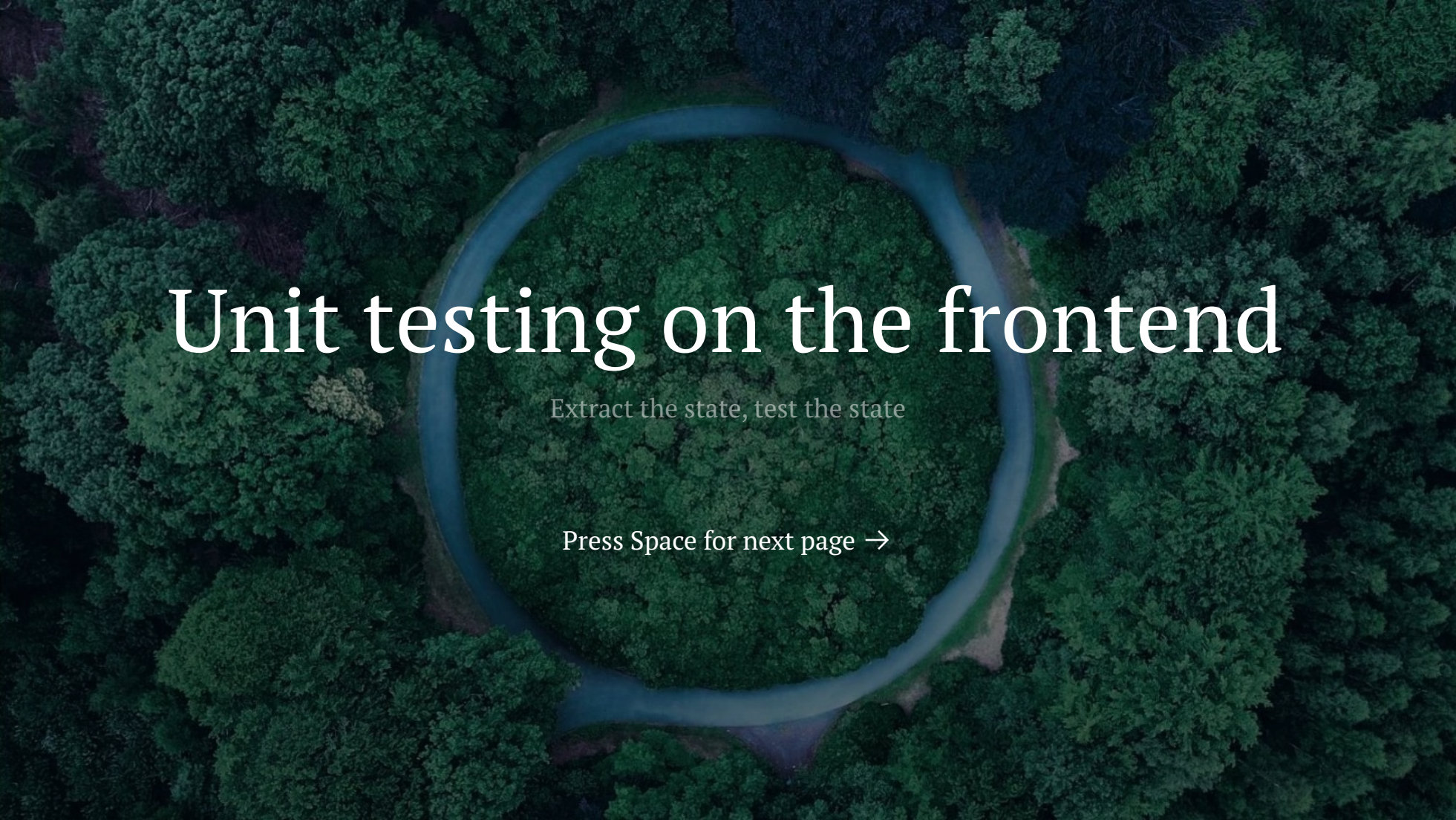
Unit testing on the frontend
Extract the state, test the state
Press Space for next page →

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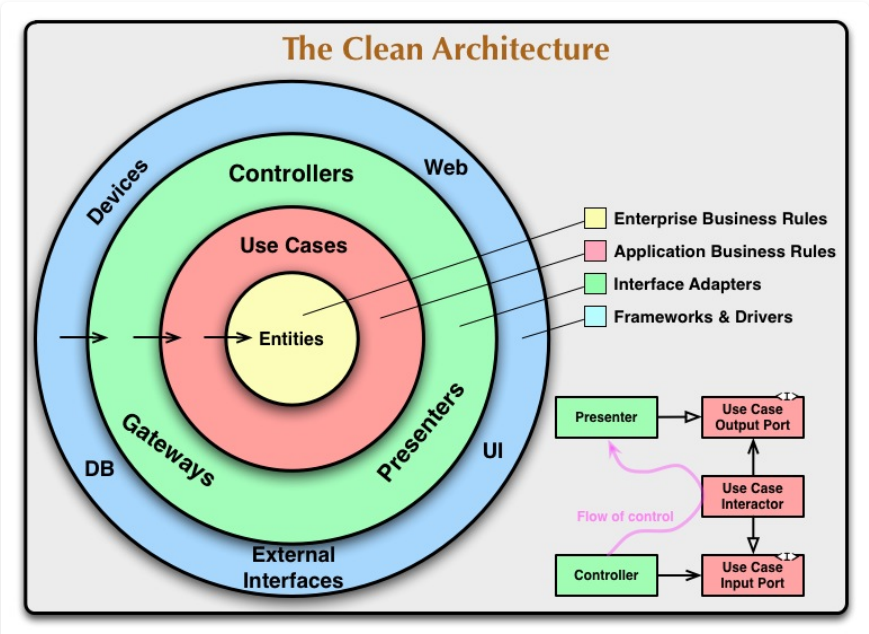
Hexagonal architecture



- Hexagonal architecture/Clean architecture/onion architecture: same idea under many names
- Domain logic should be in it's own dedicated layer
- Domain layer does not depend on any other layer (may require dependency inversion)
- Ports/adapters pattern that let replace implementation easily (SQL to elascticSearch, REST to graphQL, etc...)

Clean architecture on the backend

```
async function sendFeedbackController(request: Request, response: Response): Promise<void> {
  const feedback = z
    .object({
      payload: z.any(),
      type: feedbackTypeSchema,
    })
    .parse(request.body);
  const user = parseAuthenticatedUser(response);
  await sendFeedback({ feedback, user });
  response.send({});
}
```

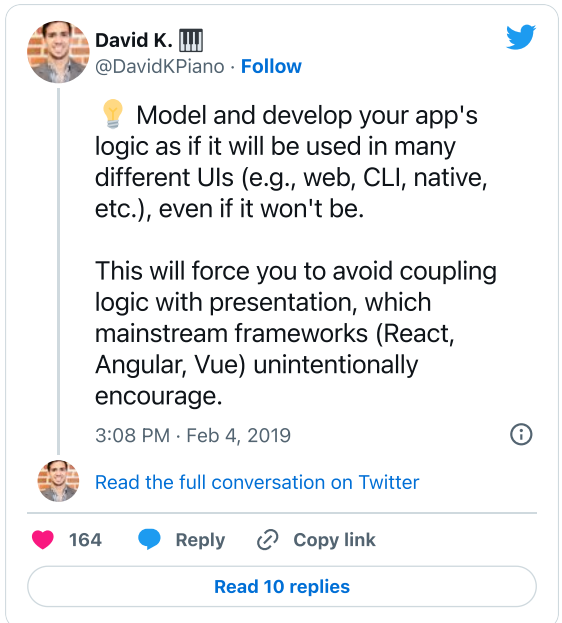
- On the backend, we remove request handling and db logic from domain services (handlers and repositories)
- See above the handler above that parse the request, calls a domain service, then send the response

Repository pattern: makes database change much easier

```
async function getReviewsByRating({ reviewFilters} : { reviewFilters: ReviewFilters }): Promise<Aggs[]> {
  if (elasticRepository.hasReviewIndex()) {
    return elasticRepository.aggregateReviewsByRating({ reviewFilters });
  }
  return SQLrepository.aggregateReviews({
    reviewFilters,
    attributes: ['rating', [Sequelize.literal('COUNT(DISTINCT(reviews.id))'), 'count']],
    group: ['rating'],
  });
}
```

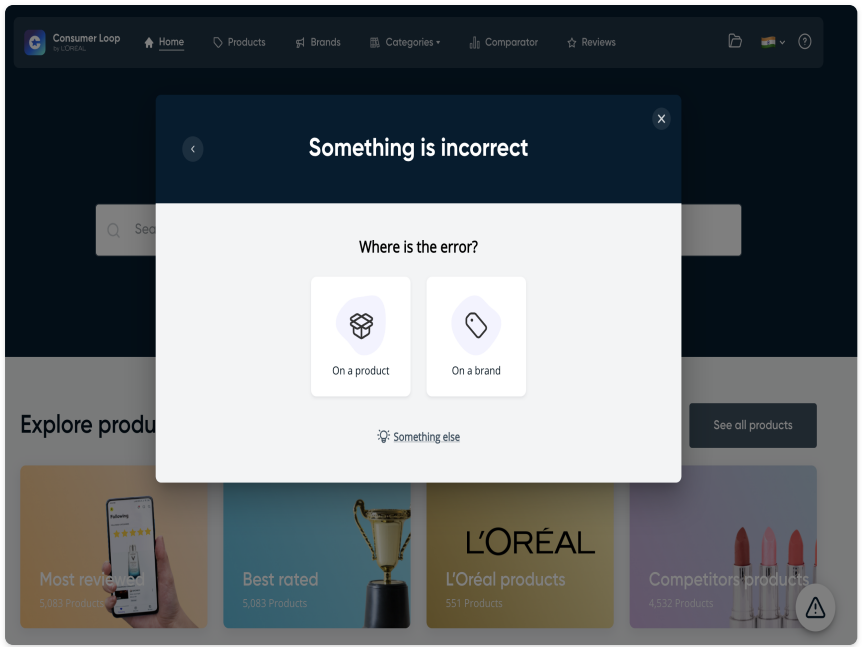
- Repository pattern: create a dedicated module to handle db logic. Quite heavy, but lets us switch from one database to another easily.
- Remark: this does NOT respect Clean Architecture by the letter. Dependency inversion wasn't done, and the SQL syntax leaks out of the SQL repository.

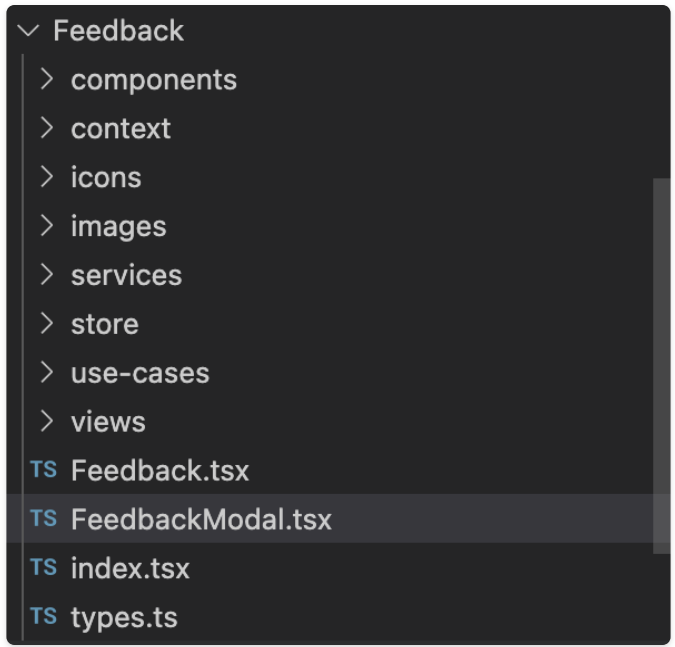
Hexagonal on the front-end: the UI as an afterthought



- The core idea: remove all UI and query from the domain logic. Imagine that there are two ways to interact with app, UI or CLI. The core logic should not be duplicated.
- All HTTP calls (Web sockets, ...) should be extracted to dedicated services
- UI interfaces extracted to presentational components
- So in practice the domain logic ends up identified to with the application global state (WARNING: this may an abuse of language)

Hexagonal on the front-end: the feedback module example





The feedback module example: an HTTP service

```
function useNewFeedback({
  options = {},
}: {
  options?: MutationOptions<Feedback>;
}): SafeMutation<Feedback> {
  const mutationFn = usePostMutationFn({ input: `/api/feedback` });
  return usePostMutation<Feedback>({ options: { mutationFn, ...options } });
}
```

- Service handling HTTP requests to backend

The feedback module example: a view

```
function IncorrectBrandName(): JSX.Element {
  const { brandId, newFeedbackMutation } = useCollaborationContext();
  const [correctName, setCorrectName] = useState<string>('');
  if (brandId === null) return <></>;
  return (
    <>
      <Header title="The name is incorrect" />
      <Body>
        <TextInput
          onChange={(event) => setCorrectName(event.target.value)}
          value={correctName}
        />
        <Actions
          onMainClick={() => sendFeedback({
              type: 'incorrectBrandName',
              payload: { brandId, correctName },
            })}
        />
      </Body>
    </>
  );
}
```

- View contains presentational logic

The feedback module example: the store

```
function useFeedbackStore({
  params = {},
  useNewFeedback,
}: FeedbackStoreProps): IFeedbackStore {
  const [isModalOpen, setIsModalOpen] = useState<boolean>(false);

  const historyStore = useFeedbackHistory({});
  const { view } = historyStore;

  const { reverse, ...navigationMethods } = useReverse(historyStore);
  const { clearHistory, goBack, goBackToStart } = navigationMethods;

  const { goTo, productId, setProductId, brandId, setBrandId } = useSelection({
    ...navigationMethods,
    params,
  });

  const newFeedbackMutation = useNewFeedback({ options: { onMutate: () => goTo('success') } });

  return { ... };
}
```

The feedback module example: a use-case

```
function useFeedbackHistory(): IFeedbackHistory {
  const [viewHistory, setViewHistory] = useState<IView[]>(['root']);

  const view = viewHistory[viewHistory.length - 1];

  const goTo = useCallback((newView) => setViewHistory((previous) => [...previous, newView]), []);
  const goBack = useMemo(() => {
    if (viewHistory.length <= 1) return null;
    return () => setViewHistory((previous) => previous.slice(0, -1));
  }, [viewHistory.length]);
  const goBackToStart = useMemo(() => {
    if (viewHistory.length <= 1) return null;
    return () => setViewHistory(['root']);
  }, [viewHistory.length]);

  return { view, goTo, goBack, goBackToStart  };
}
```

- Navigation use-case: the user may go back to previous view, or back to start
- Use-case is extracted in its dedicated hook

Testing the navigation use-case

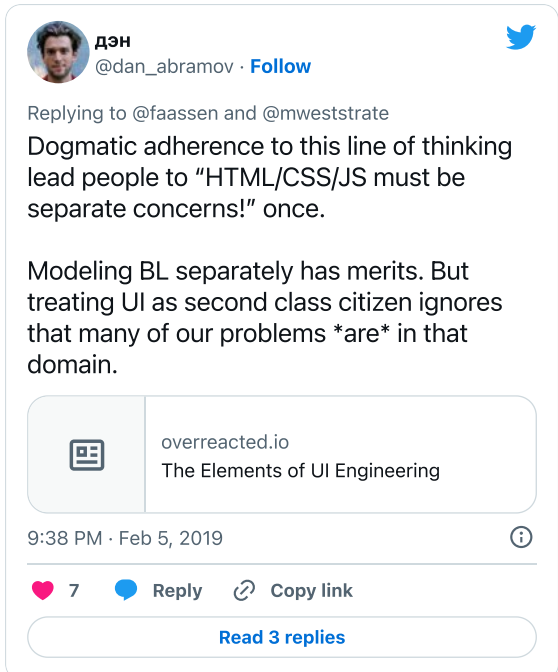
```
describe('useFeedbackStore', () => {
  describe('goBack', () => {
    it('should go back to previous view', () => {
      const feedbackStore = setupStore({});
      act(() => feedbackStore.goTo('missingBrand'));
      act(() => feedbackStore.goTo('success'));

      act(() => {
        if (feedbackStore.goBack === null) return;
        feedbackStore.goBack();
      });

      expect(feedbackStore.view).toEqual('missingBrand');
    });
  });
});
```

- We test the use-case on the store of the module global state
- Remark: we did NOT test the use-case hook directly. That would couple the test to the implementation, require more tests, and cover less code.

Limitations - UI is complex and valuable



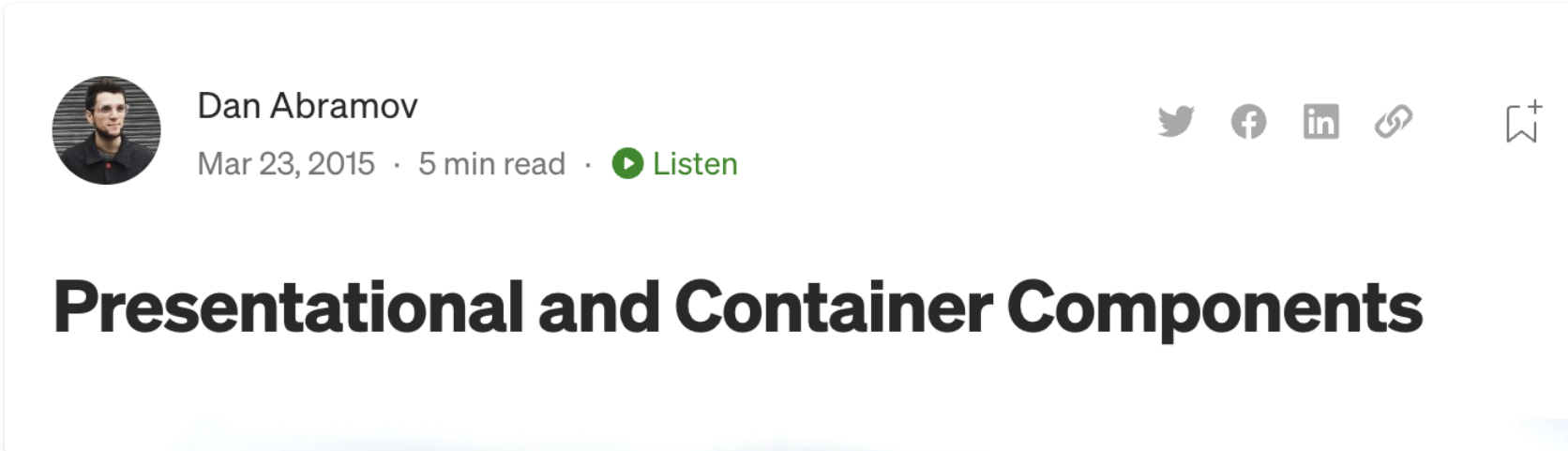
- UI is a critical part of the value created by our application. There is not a single CLI interface with mass-adoption. And it can be very complicated, much more complex that query handlers for instance. So it’s mistake to treat UI as an implementation detail.
- Dogmatic separation of state/presentation can create artificial boundaries. Simple components can (and should) own their own state/presentation.

Why does it work? Human/machine have different strengths

case/tester	Human	Machine
State machine	Bad	Very good
UI	Very good	Bad

- Humans visual capabilities are very advanced. We can detect visual bugs very easily without any automated testing. But we do struggle to check that algorithms correctly implement business logic.
- The reverse is true for machines. So the highest ROI testing strategy is to extract the state/BL logic to test automatically, and check visually that the UI is correct.

Presentational components vs container components



- Famous article distinguishing presentation components (mainly UI) from container components (mainly state)
- old nomenclature: smart vs dumb
- Remark: don’t be dogmatic, use hooks, etc…

Headless libraries

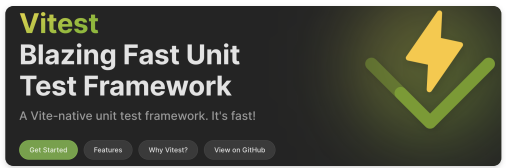
Some libraries only handle the stateful portion of the components. There are called "headless" libraries.

See tanstack Table, which in React is a simple hook:

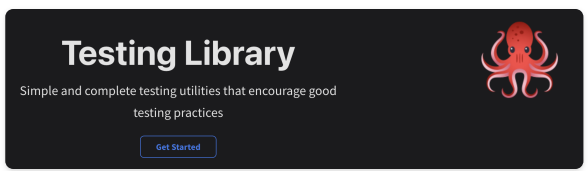
```
const table = useReactTable({
  data,
  columns,
  getCoreRowModel: getCoreRowModel(),
})
```

Testing libraries (React)

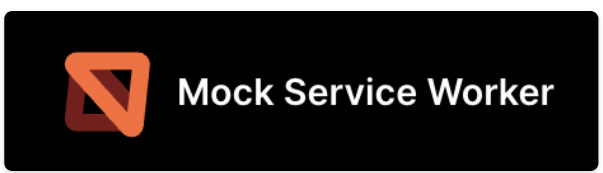
- Vitest - jest but cooler (and much faster)



- React Testing library - jsx testing made easy



- Mock service worker - intercept HTTP calls to avoid mocking



Architecture:

- Clean architecture: https://blog.cleancoder.com/uncle-bob/2012/08/13/the-clean-architecture.html
- Presentational and Container Components: https://medium.com/@dan_abramov/smart-and-dumb-components-7ca2f9a7c7d0
- UI as an afterthought: https://michel.codes/blogs/ui-as-an-afterthought

Libraries:

- Mock service worker: https://mswjs.io/
- React Testing library: https://testing-library.com/
- Vitest: https://vitest.dev/

React tests:

- How to test custom React hooks: https://kentcdodds.com/blog/how-to-test-custom-react-hooks
- Stop mocking fetch: https://kentcdodds.com/blog/stop-mocking-fetch

QUESTIONS AND REMARKS

Ekimetrics.