Quick functional UI sketches with Lua templates and mermaid.js

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Talk plan

1. The Case
2. Approaches to design
3. Enter the Mermaid
4. Lugram Templates
5. Conclusion
6. Questions?

About me

- Programmer background
- Mainly doing management work now
- In löve with Lua since 2005

The Case

- A huge professional enterprise application
- being converted from 20-year-old windows app
- to a modern SPA web-app.

The product is huge

Sufficient expertise can only be found on a team level:

- Technology experts don’t have product-level vision
- PO and PM don’t draw professionally (and lack deep insight on the tech)
- Designer does not have the professional-level technology expertise

The UI design and development process

For each ”screen” in the application:

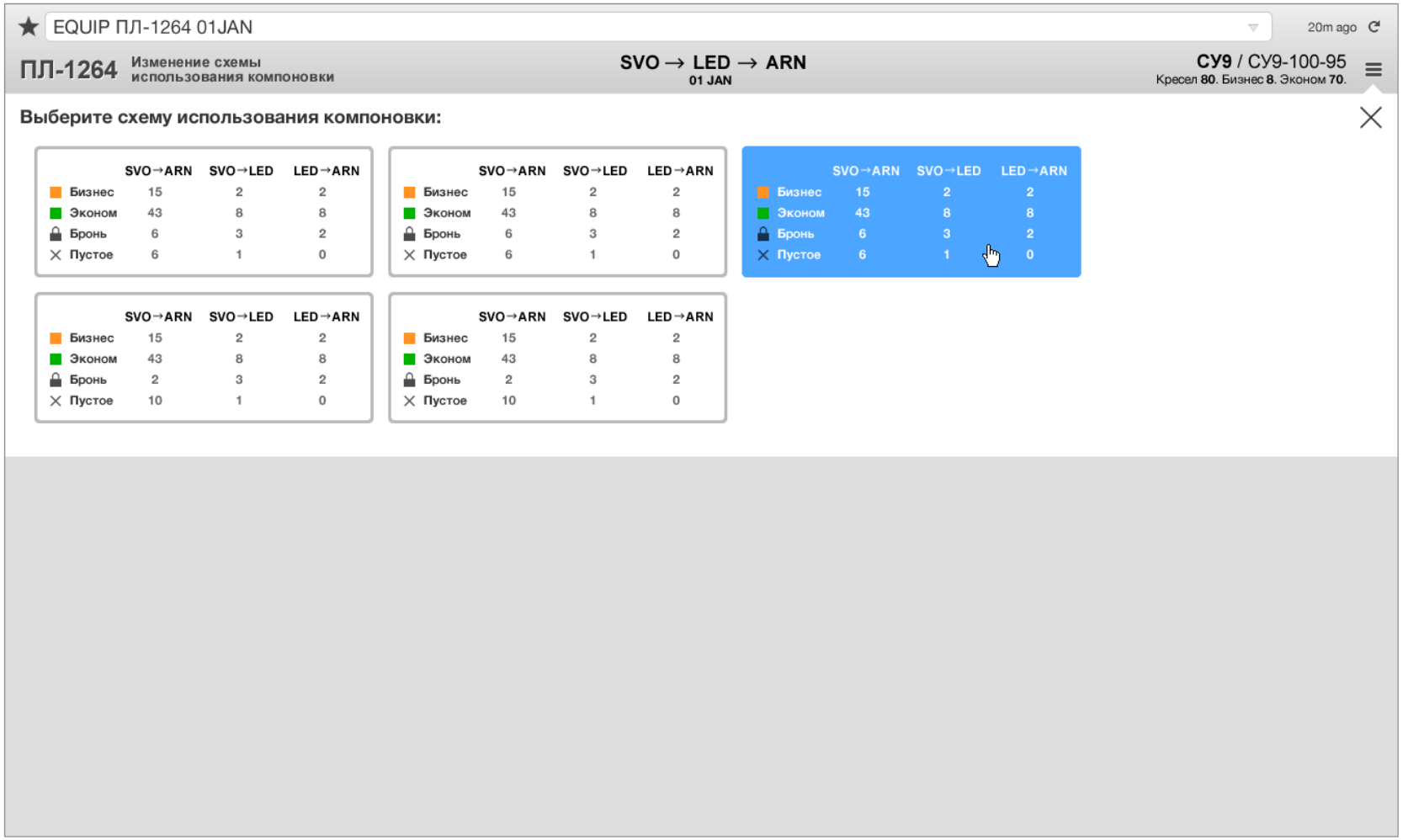
- Concept
- Functional sketches and (sometimes) interactive studies
- Design sketches
- Layout implementation
- Business logic implementation

A functional sketch

What is on the screen, how does it WORK?

A design sketch

How does it LOOK?



Goals

- I need a diagram of the flow between app screens
- I need functional sketches of the screens themselves
- Basically it doesn’t matter how I make them as long as they are easy to make and change and there are some facilities for reuse.

What tools to use?

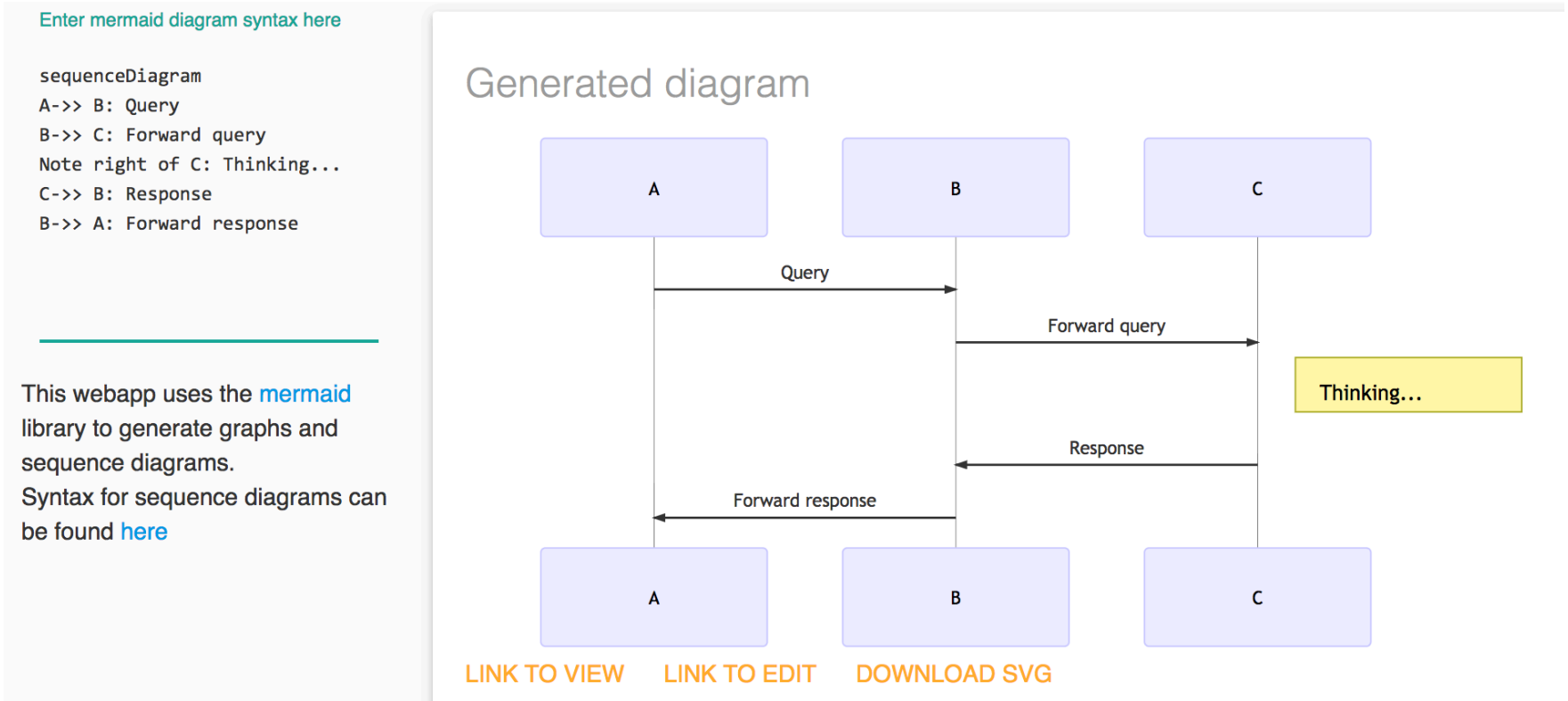
- Photoshop (Krita, Gimp...)
- InkScape
- Google Documents
- Visio
- Balsamiq
- Sketch
- ...

I’m a programmer, I’m better with structured text than with images.

I work fastest with the keyboard, not having to touch the mouse.

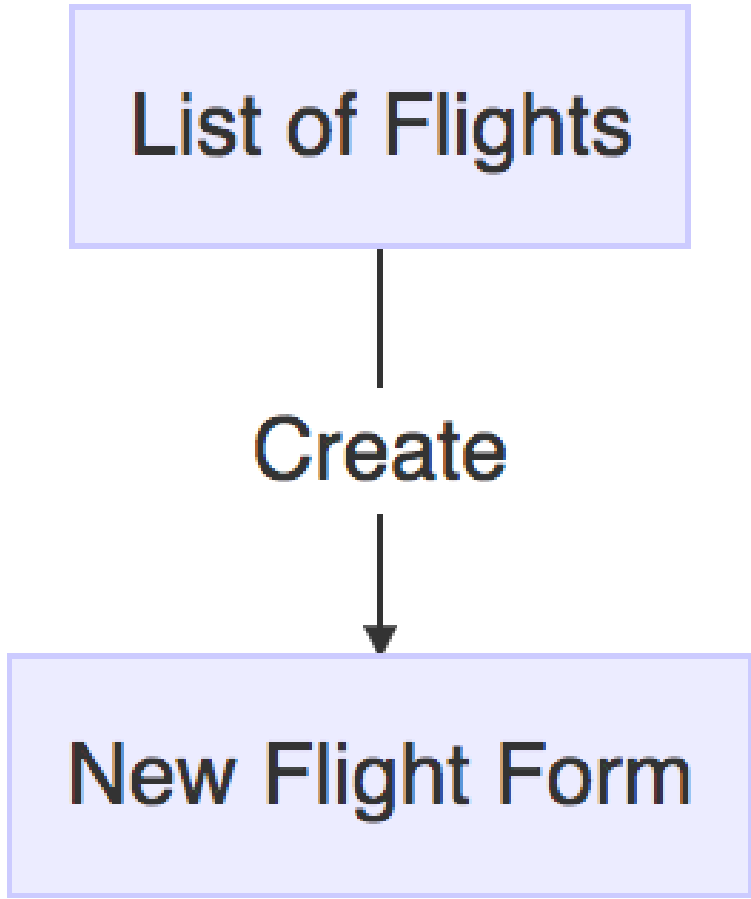
Enter the Mermaid

http://bit.ly/mermaid-editor



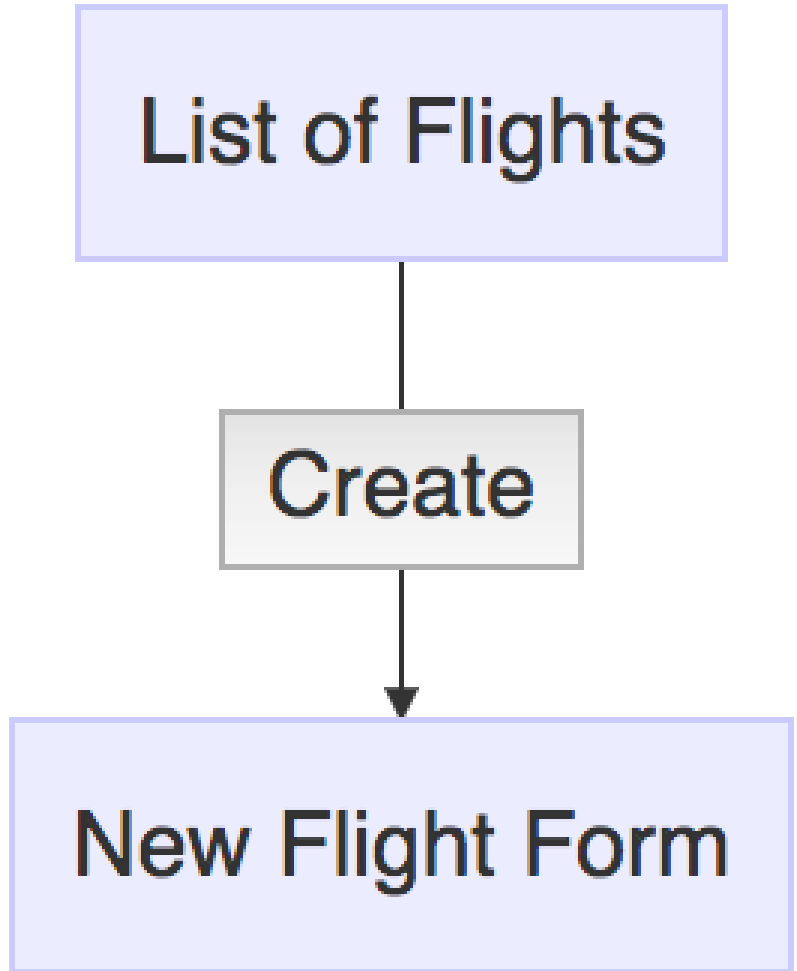
Screen Flow Diagram

```
graph TD

list[List of Flights]
new[New Flight Form]

list-->|Create|new
```



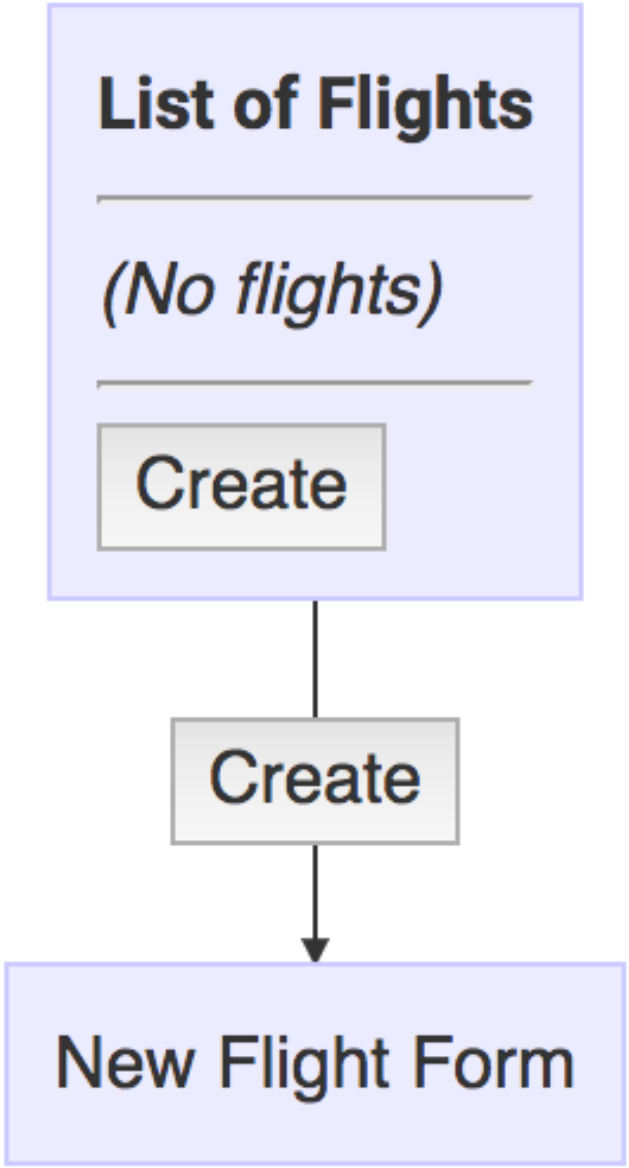
Screen Flow Diagram (II)

```
graph TD

list[List of Flights]
new[New Flight Form]

list-->|"<button>Create</bu
```



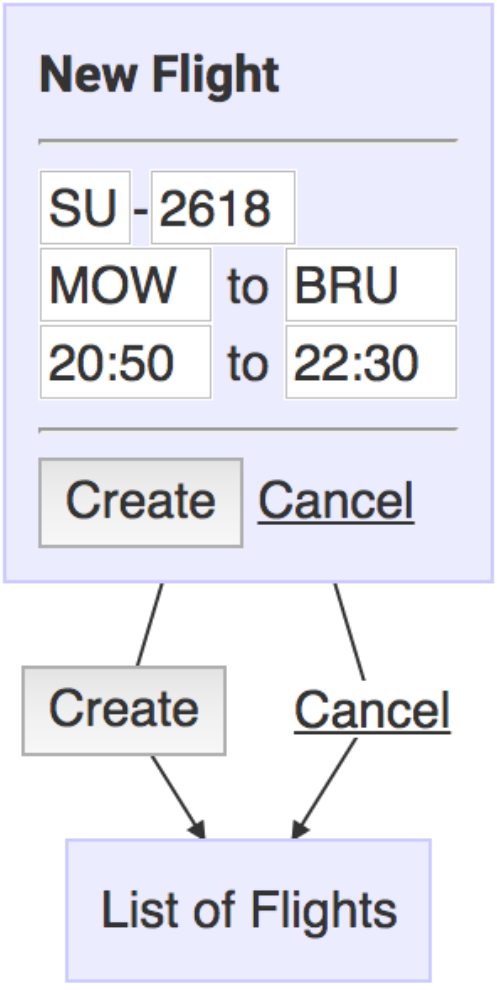
Screen Prototypes

```
graph TD

list["<b>List of Flights</b><
    <i>(No flights)</i><hr>
    <button>Create</button>"]

new["New Flight Form"]
list-->|"<button>Create</butt
```

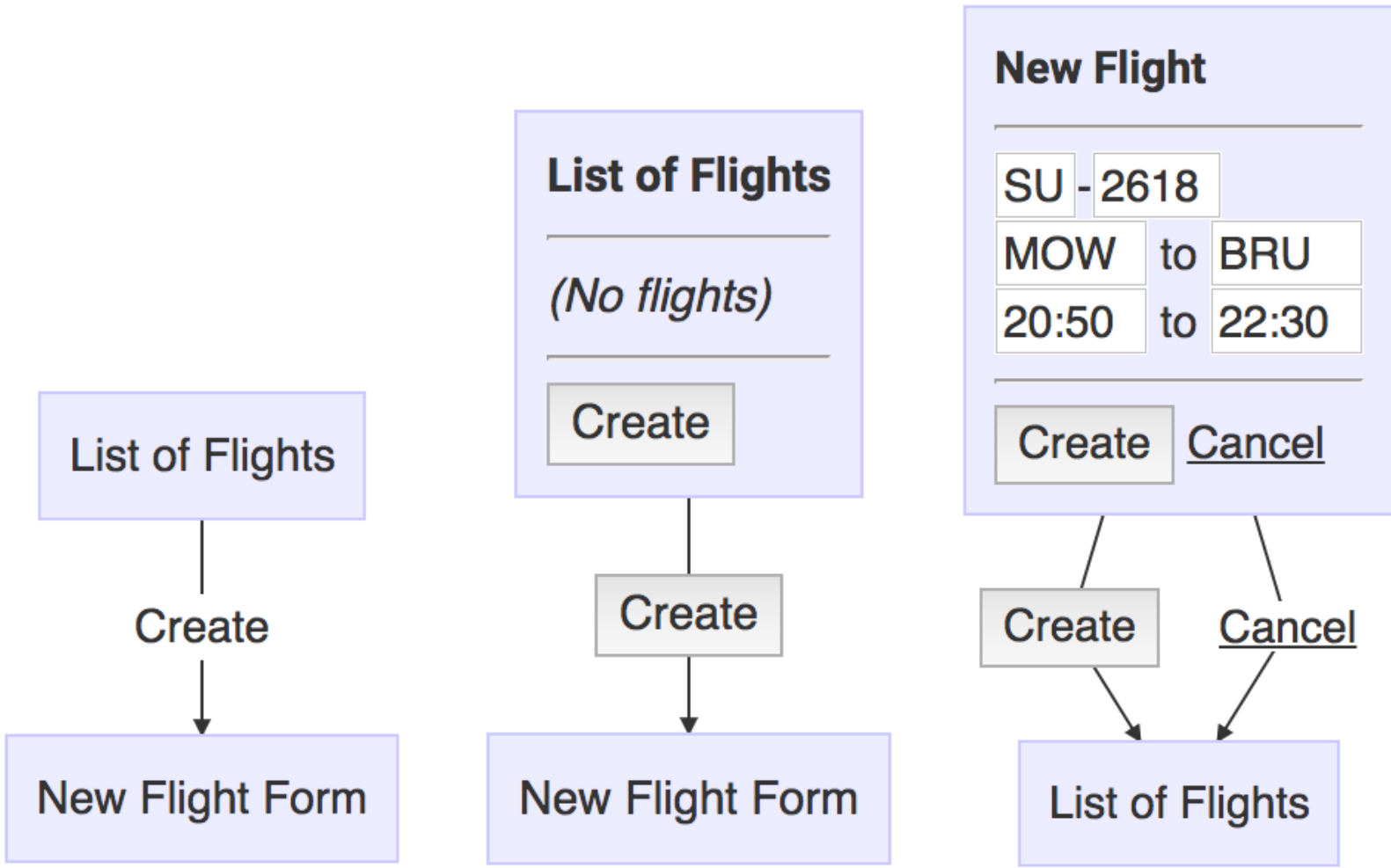


Screen Prototypes (II)

```
graph TD
list["List of Flights"]
new["<b>New Flight</b><hr>
<input value='SU' size='2'>-
<input value='2618' size='4'><br>
<input value='MOW' size='5'> to
<input value='BRU' size='5'><br>
<input value='20:50' size='5'> to
<input value='22:30' size='5'>
<hr><button>Create</button>
<u>Cancel</u>"]
new-->|"<button>Create
  </button>"|list
new-->|"<u>Cancel</u>"|list
```



Basic Documentation Structure



It is hard to do HTML without templates

list.tpl

```
<b>${title List of Flights}</b><hr>
<i>(No flights)</i><hr>
${link new <button>Create</button>}
```

new.tpl

```
<b>${title New Flight}</b><hr>
<input value='SU' size='2'>-
  <input value='2618' size='4'><br>
<input value='MOW' size='4'> to
  <input value='BRU' size='4'><br>
<input value='20:50' size='5'> to
  <input value='10:30' size='5'><hr>
${link list <button>Create</button>}
${link list <button>Cancel</button>}
```

Basic helpers

```
${title New Flight}
```

$title <text:*>

```
${link list <button>Create</button>}
```

$link <screen:word> <body:*>

Basic helpers: pass-through definitions

```
${define title {{'*', 'text'}} [[${text}]]}

${title New Flight} --> New Flight

${define link
  {{'word', 'target'}, {'*', 'body'}}
  [[${body}]]}

${link list <button>Create</button>}
--> <button>Create</button>
```

$define <symbol:word> <arguments:table> <code:*>

define

```
define = function(context, str)
  local symbol, str = eat.word(str)
  local args, str = eat.table(str)
  local code, str = eat['*'](str)
  args, code = lua_value(args), lua_value(code)
  if type(code) == 'string' then code =
    function(ctx) return ctx:replace(code) end
  end
  context._ROOT[symbol] = function(parent, str)
    local ctx = { }
    for i = 1, #args do
      ctx[args[i][1]], str = eat[args[i][2]](str)
    end
    return code(parent:push(ctx))
  end
end
```

helpers: definitions using Lua

```
${define title {{'*', 'text'}} function(context)
  local text = context:replace(context.text)
  context._ROOT._SCREENS[text] = text
  return text
end}

${define link {{'word', 'target'}, {'*', 'body'}}
function(context)
  local target = context:replace(context.text)
  context._ROOT._LINKS[target] = context._MODULE
  context:include(target) -- Ignoring result
  return context:replace(context.body)
end}
```

include

```
include = function(context, template)
  return context:push(
    { _MODULE = template }
  ):replace(
    assert(io.open(filename)):read("*a")
  )
end
```

Diagram styles

Depending on how you define $title and $link, you get several kinds of diagram from the same set of templates:

- Outline diagram (titles and arrows only, ”screen flow”)
- Closeup diagram (screen content and flow from this screen to others)
- Printable diagram (screen content only)

More Useful helpers

```
${define # {{'*', 'comment'}} [[]]}
${define --[HR]------..---------- {} [[<hr>]]}

${define expr {{'*', 'code'}} function(context)
  return assert(loadstring('return '
    .. context:replace(context.code)))()
end}
```

with helper

```
${define with {{'table', 'more_context'},
  {'*', 'body'}} function(context)
  return context:replace(
    context:push(context.more_context),
    context.body)
end}

${define form {} [[
  ${when editable
    <input value='MOW'> to <input value='BRU'>}
  ${unless editable MOW to BRU}
]]}

${with {editable = true} ${form}}
```

with helper (II)

```
${define histogram {{'word', 'a'},
  {'word', 'b'}, {'word', 'c'}} [[
${with { w = '${expr ${a} + ${b} + {c}}' }
  <div style='width:${w}px' class='red'>
    <div style='width:${a}px'
      class='green'>${a}</div>
    <div style='width:${b}px'
      class='blue'>${b}</div>
  </div>
}]]}

${histogram 1 2 3}
```

Some statistics

- Two days to implement core, about 250 LOC.
- After six months of non-fulltime usage, core grew to about 330 LOC, mostly additional diagnostics.
- About 60 sketches finalized (5KLOC of templates), more to come.

Was it worth it?

Yes.

- I’ve got a low-cost lightweight flexible framework for design that does not chafe in wrong places.
- Its output, while not ideal, is reasonably understandable by all members of the team.
- Also: much fun implementing yet another template engine.

Why not X?

- The cost is so low, the adaptation of existing tool to my requirements (or just learning the proper ropes) would probably cost about the same.
- But if you know a good candidate that fits here, please do chime in.

Problems

- Error diagnostics and debugging for templates. Almost non-existent. Lots of low-hanging fruit there.
- Debugging of the HTML output render. IE6-hard, rather difficult to improve. Keep HTML simple.
- Expressive power of the language could be improved. No need so far.

Questions?

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