# Frontend implementation

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  - Work with stateless nature of HTTP

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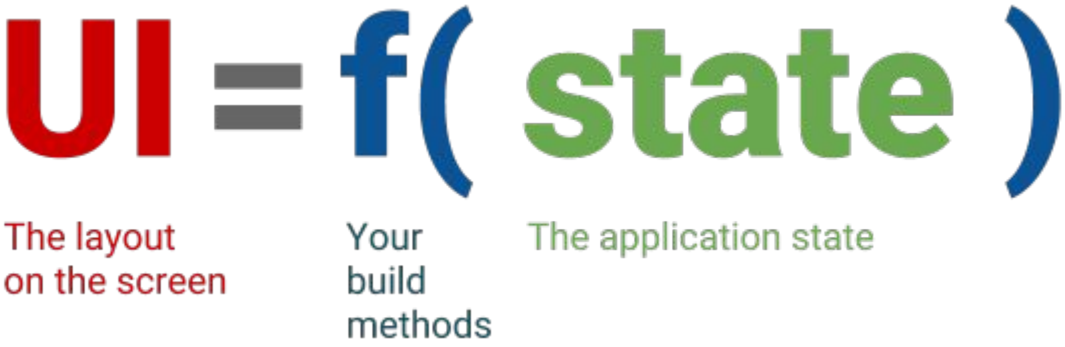
  - Work with stateless nature of HTTP
- Desirable
  - Aesthetically pleasing
  - Responsive - no lag / latency
  - Adaptive - different screens

# Programming Styles

- Imperative: sequence of actions to achieve final result
  - Draw boxes for navigation, main text, fill in text, wait for clicks etc.
  - Functions for each step, composition of functions
- Declarative: specify desired result
  - Compiler / Interpreter knows how to achieve result
  - Function integration automated



Credit: Flutter documentation “Start thinking declaratively”

# State?

- Internal details of the system: memory
- Reproducibility
  - Given a “system state”, the system should always respond the same way to input
- Complexity
  - Any non-trivial application needs internal state

# System State

- Complete database of amazon.in, flipkart.com
  - Stocks of available items, prices, logged in/registered users etc.
- All news articles ever published on toi.com, thehindu.com, bbc.com
- All students, courses, marks, certificates etc. for NPTEL

Typically huge, but comprehensive

- Completely independent of the user interface / frontend!

# Application State

Application:

- System as seen by an individual user / session
- Includes interactivity, session management

Examples:

- Shopping cart, user preferences, theme
- Followed news items, recommendations
- Dashboard displays

# UI State (Ephemeral State)

UI

- Part of application actually seen / interacted with
- Ephemeral - “lasting for a very short time” (term used by Flutter)

Examples:

- Loading icons
- Currently selected tab in multi-tab document / page

# Application and UI management

- HTTP is stateless
- How to convey state between client and server?
  - Client maintains state - sends requests to server for specific items
  - Server maintains state - only specific requests allowed to client

# Example: Tic-Tac-Toe

- What to display on screen?
- Who determines the display?
- How should user input be collected and processed?