Designing Interface Specifications

17-423/723 Software System Design

Recitation 3
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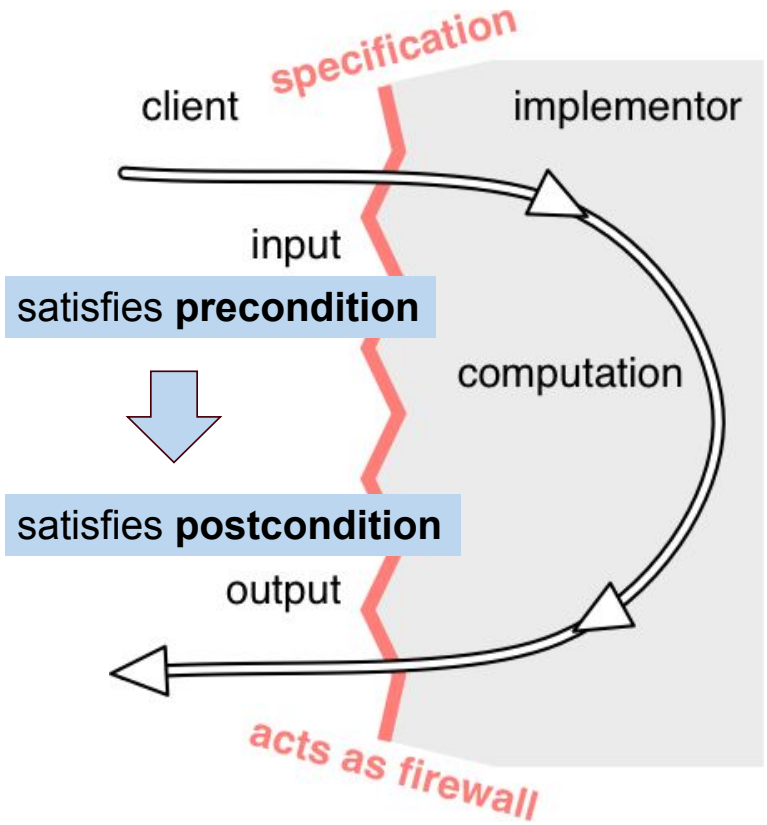
Recap: Interface Specifications

Interface Specifications

- **Contract** between a client and a component
- Each specification of a function is associated with **pre-** & **post-conditions**
- **Pre-condition**: What the component **expects from the client**
- **Post-condition**: What the component **promises to deliver**
- **Meaning** of a specification: If the client satisfies the pre, the component guarantees the post-condition



Dimensions for Specification Design

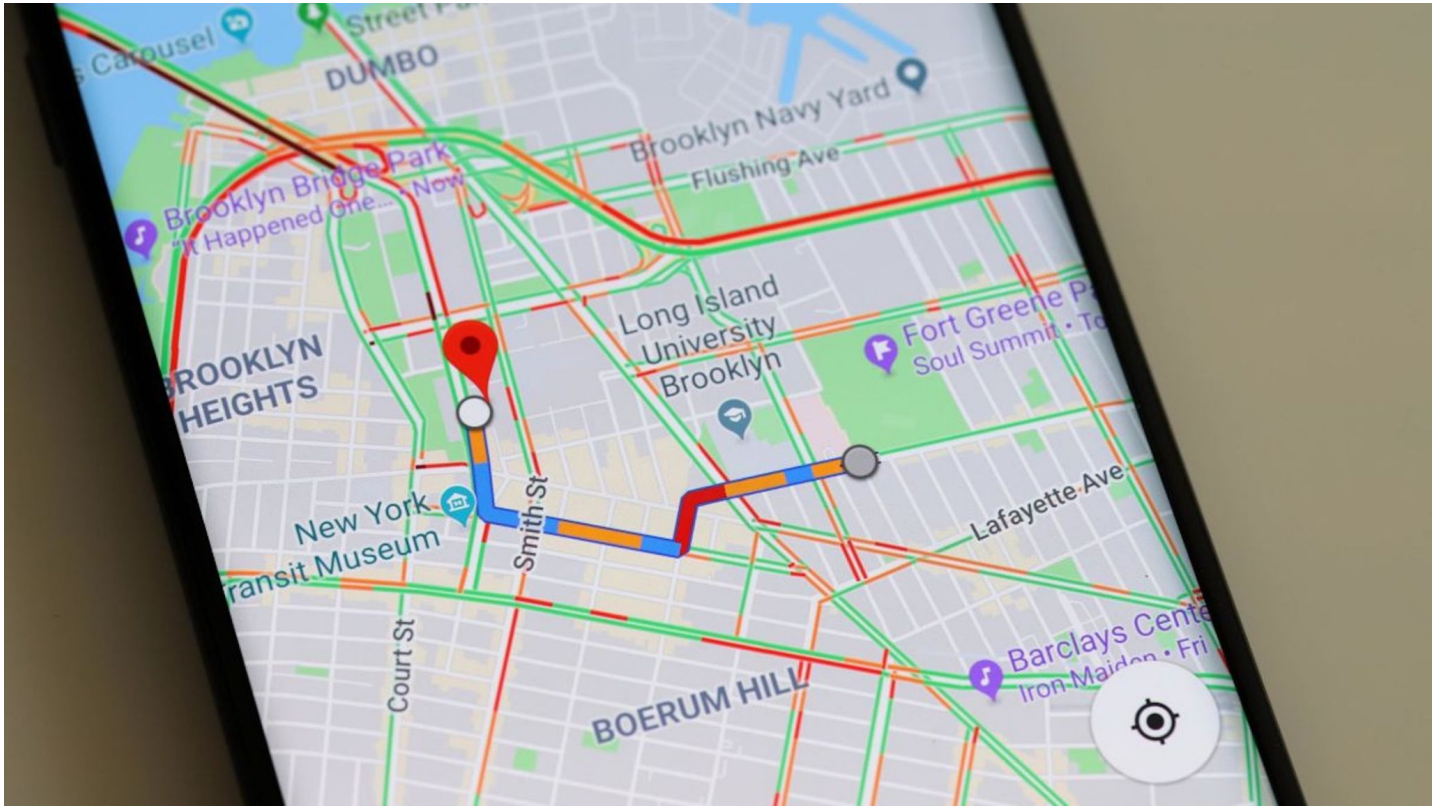
Deterministic vs. under-determined: Deterministic is preferred

Declarative vs. operational: Declarative is preferred

Strong vs. weak: Strong enough for what the client needs, but as weak as possible

General vs. restrictive: As general as possible, but restrictive if necessary for performance reasons

Example: Navigation App



Estimated Time of Arrival (ETA) Service

Imagine that you are in charge of developing a service (**EtaService**) that estimates the travel time from a source to a destination location at a particular time of departure (e.g., right now, 9 am tomorrow, etc.,).

You are working with another engineer who is responsible for building a component (**RouteFinder**) with the capability to find possibly multiple routes from a source to a destination location. Each route is represented as a list of road segments.

Furthermore, there is an external service (**TrafficAPI**) that can be queried to estimate the amount of duration time over a particular road segment.

You've already finished designing the user-facing interface for **EtaService**. Your task now is to work with the other engineer to design and agree on how the interface of **RouteFinder** should be specified.

Design Decisions to Consider

- Which of the two components (EtaService, RouteFinder, or both) should use TrafficAPI?
- **(Optimality)** How do you ensure that the ETA result shown to the user is minimal (i.e., time when the optimal route is taken)?
- **(Accuracy)** How do you ensure that the ETA result shown to the user is accurate (i.e., it reflects the traffic at departure time)?
- **(Performance)** How do you ensure that EtaService is responsive (e.g., returns a result within 1~2 seconds)?
- **(Cost)** How do you keep the costs of using TrafficAPI down?

Activity: Interface Specification Design

- Pair up with the person next to you.
- Assume one of the two roles: (1) EtaService developer and (2) RouteFinder developer
- **Task 1**. Work together to develop a specification for RouteFinder. Record your answer in the provided activity sheet.
- **Task 2**. Share your result with another pair. Evaluate each other's interface along the four dimensions. Suggest ways to improve the specification.
- **Task 3**. Consider trade-offs between alternative designs of RouteFinder along relevant quality attributes.

Summary

- Designing interface specifications involve decisions about the division of responsibilities between a service provider and its client(s)
- This often involves negotiation between the developers of the client and the provider component
- Apply the four dimensions to evaluate the appropriateness of an interface specification