Software Design & Architecture

Architecture Styles / MVVM (Model-View-ViewModel)

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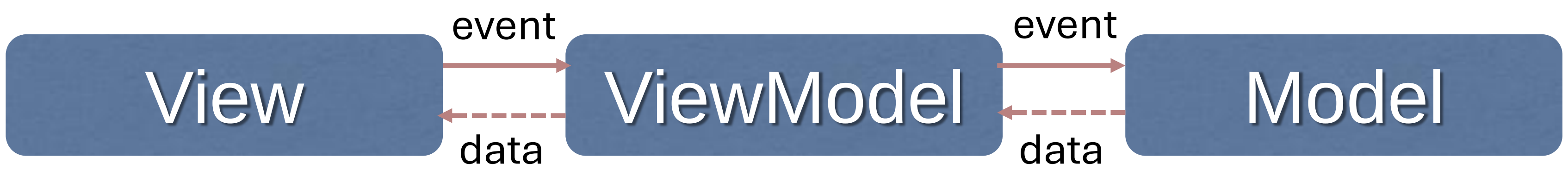
Acknowledgements: slides adapted from previous versions by Mei Nagappan and Shane McIntosh, which are adapted from previous versions by Zhen Ming Jiang, Ahmed E. Hassan, Reid Holmes.

Agenda

- MVVM
  - topology
  - demo
  - pros & cons
  - vs. MVC, MVP

MVVM Topology



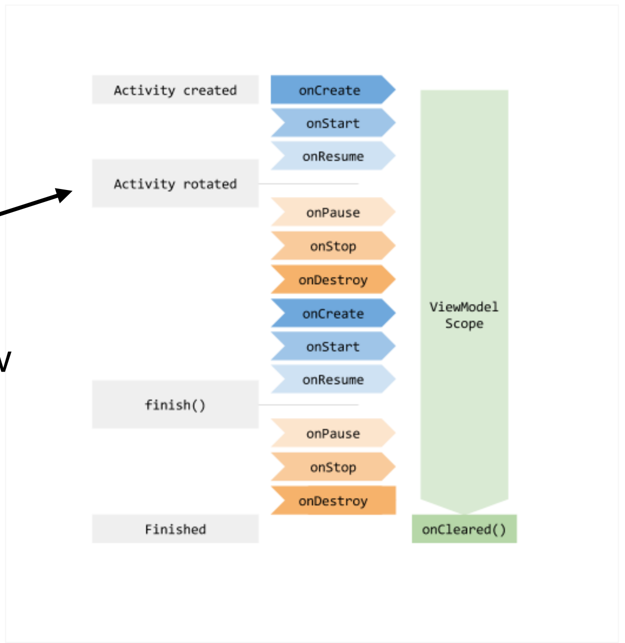
UI components
UI logic (e.g., animation)

UI state
Event & data adaptor

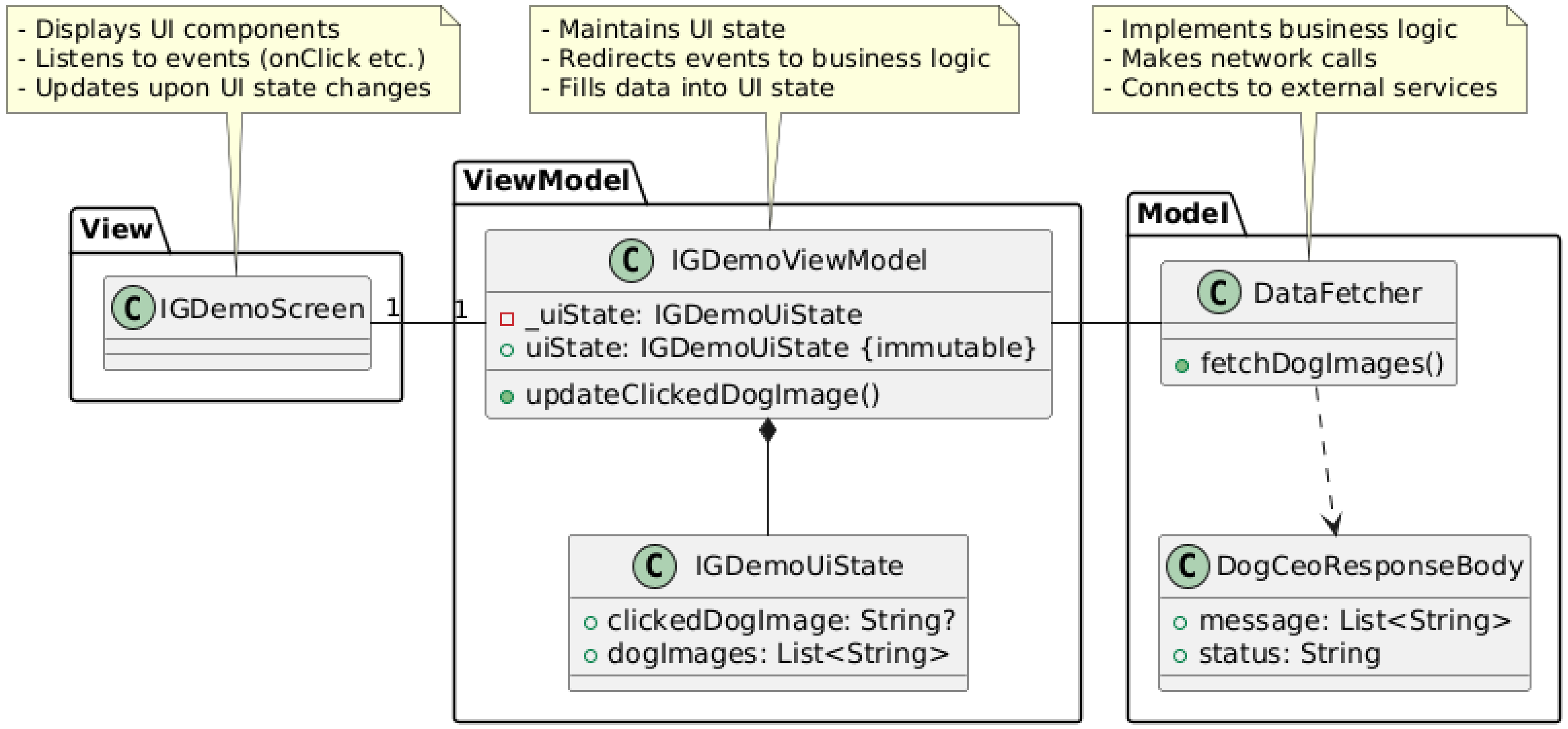
Application data
Business logic

Why?
The lifecycle of View is designed around display and can be shorter than you expect

View (Activity and the Composables) may be destroyed
- during “configuration change”, e.g., rotation, multi-window
- anytime if the app is not on foreground



Class Diagram of the MVVM Demo



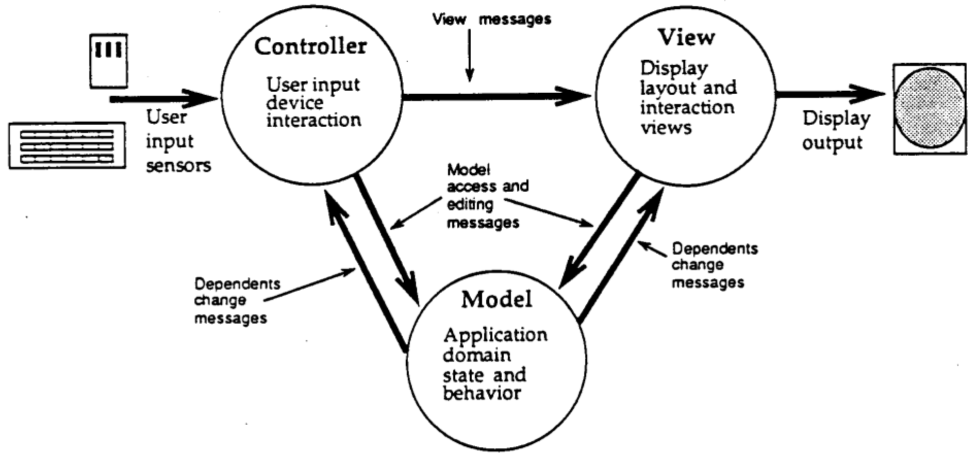
MVVM Pros & Cons

+ Separation of concerns
+ View becomes stateless, can be destroyed and recreated easily
+ ViewModel can be shared by multiple Views
+ Easier to unit test

- Overkill for simple state
- Harder to debug

MVVM vs. MVC

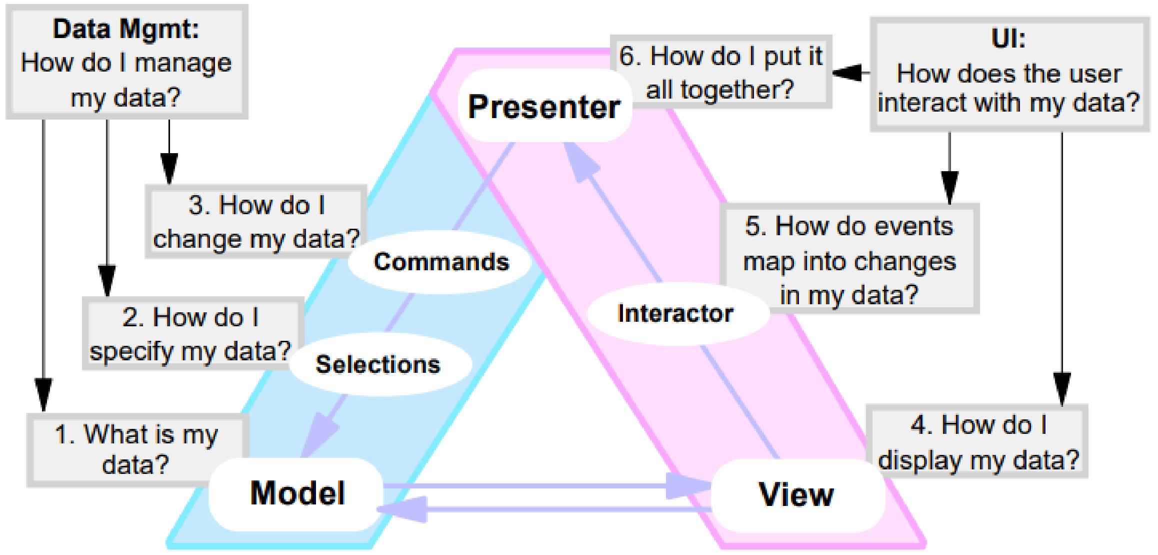
- Controller:
  - originally defined (in 1988) as the component for handling user inputs
  - in practice, a component overloaded with many functions (UI state update, event handling, business logic) and tightly coupled with View
- ViewModel:
  - loose coupling with View
  - very few business logic


Controller
User input device interaction
View messages
View
Display layout and interaction views
Display output
User input sensors
Model access and editing messages
Dependents change messages
Dependents change messages
Model
Application domain state and behavior

https://www.lri.fr/~mbl/ENS/FundHCI/2019/papers/Krasner-JOOP88.pdf

MVVM vs. MVP

- Presenter:
  - clarify its role as the adaptor between View and Model
  - has reference to View
- ViewModel:
  - doesn't have reference to View (so that they can have different lifecycle)


Data Mgmt: How do I manage my data?
3. How do I change my data?
2. How do I specify my data?
1. What is my data?
Commands
Selections
Model
Presenter
6. How do I put it all together?
UI: How does the user interact with my data?
5. How do events map into changes in my data?
Interactor
4. How do I display my data?
View

https://www.wildcrest.com/Potel/Portfolio/mvp.pdf

Resources

- Sample repos
  - App repo: https://github.com/android/nowinandroid
  - ...and its documentation about architecture: https://github.com/android/nowinandroid/blob/main/docs/ArchitectureLearningJourney.md
- Android guide to app architecture: https://developer.android.com/topic/architecture
- ViewModel documentation in Android: https://developer.android.com/topic/libraries/architecture/viewmodel

P2: Project Proposal due this Friday!