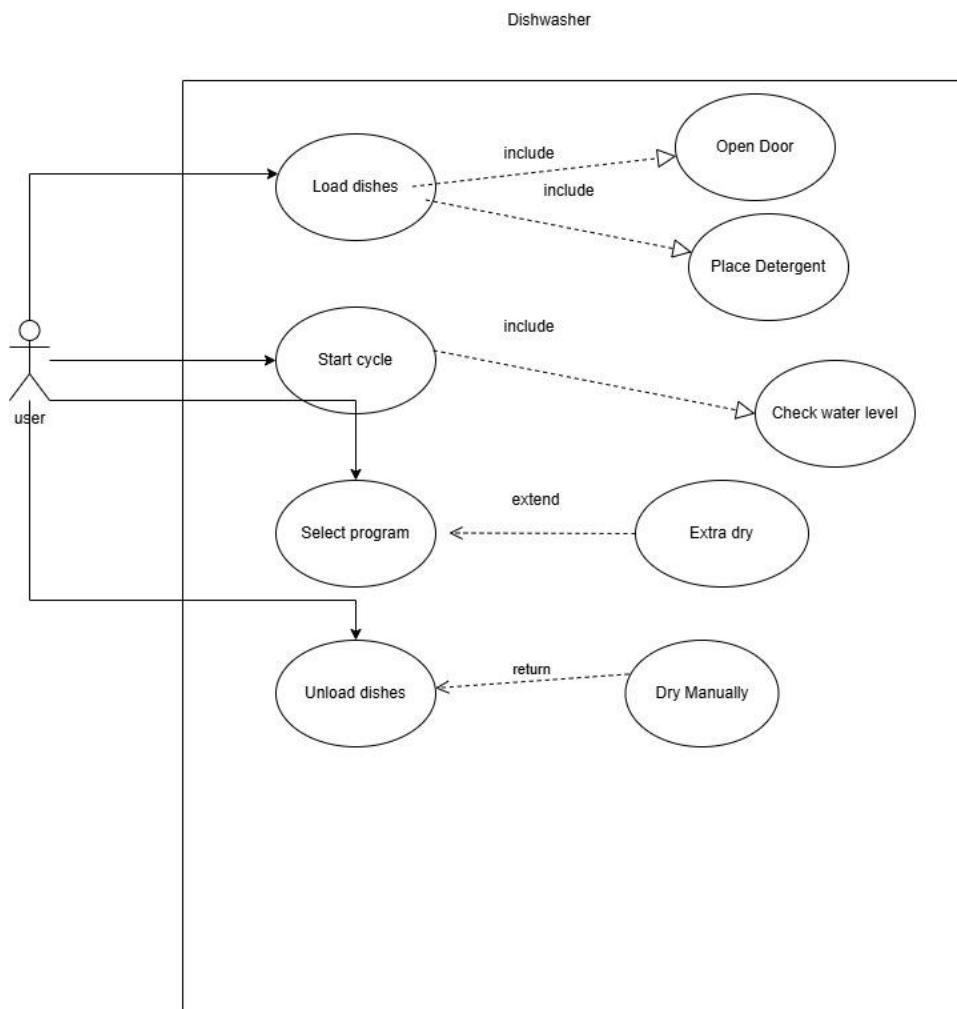# Dishwasher System Analysis

1. Use Case Diagram – Dishwasher

Diagram 1: Use Case Diagram

The use case diagram models the interaction between the User and the Dishwasher system, focusing on the main scenarios involved in operating a dishwasher. It shows external behavior from the user's perspective.

Actors:
- User: Operates the dishwasher—loads dishes, selects programs, starts or pauses cycles,

monitors progress, and unloads dishes.
- System: Includes any required external services (water, power, maintenance).

Use Cases:
- Load Dishes: User puts dirty dishes in the machine.
- Add Detergent: User adds detergent before starting the wash.
- Select Program: User selects wash cycle (Normal, Eco, Intensive, etc.).
- Start/Pause Cycle: User starts or pauses the operation.
- Monitor Progress: User can see the current state of the cycle.
- Receive Alerts: System notifies user about errors or states (e.g., water supply low).
- Unload Dishes: User removes clean dishes at the end.

2. Block Definition Diagram (BDD) – Top Level

Diagram 2: BDD – Dishwasher Structure
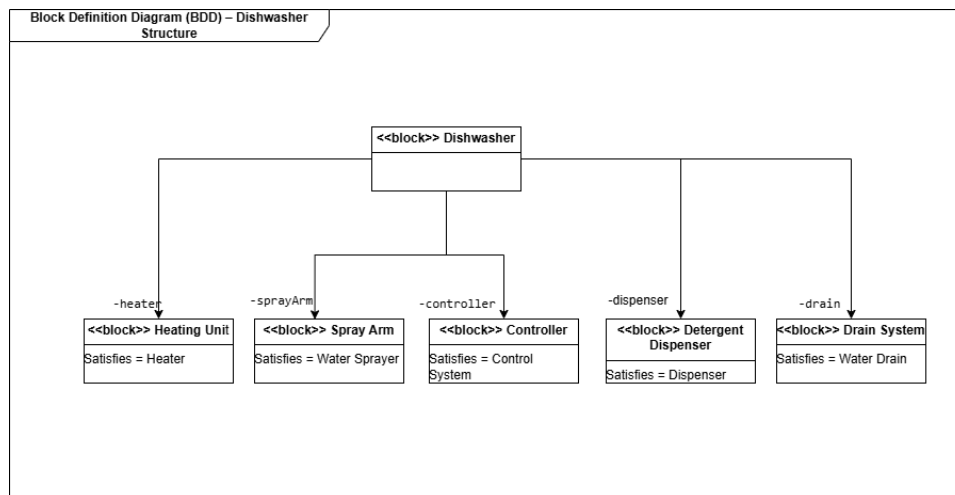
The Block Definition Diagram (BDD) shows the structural decomposition of the dishwasher system, with the main blocks and their roles.

Main Block:
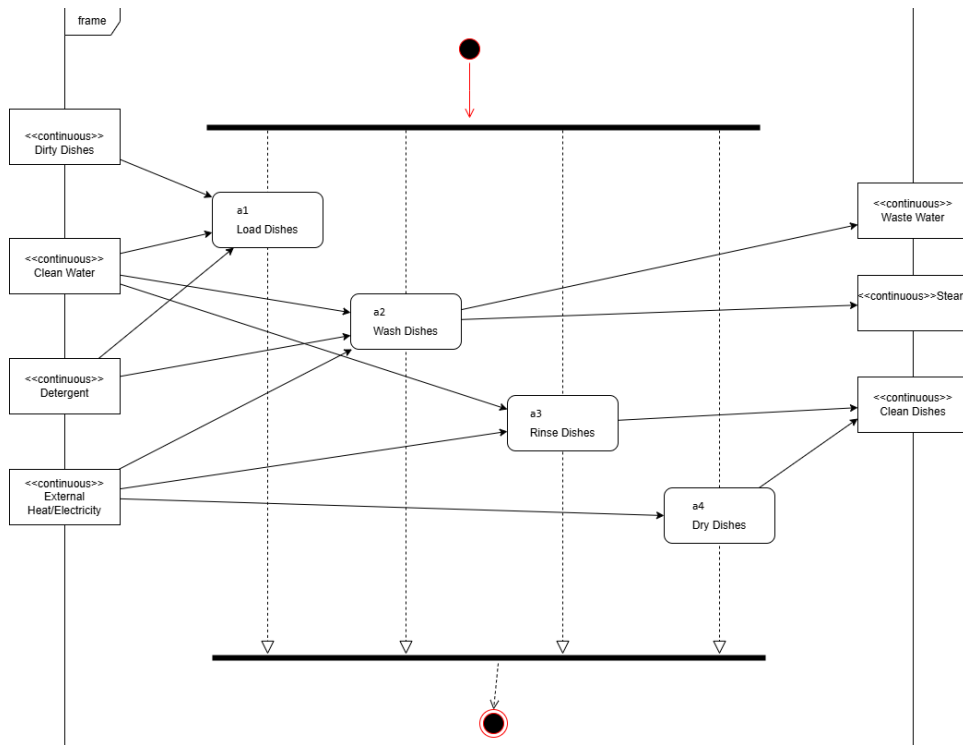- Dishwasher: Top-level system.

Sub-Blocks:
- Heating Unit: Heats the water.
- Spray Arm: Distributes water inside.
- Controller: Manages cycles and operations.

- Detergent Dispenser: Dispenses cleaning agent.
- Drain System: Removes waste water.

3. Activity Diagram – Black Box Scenario

Diagram 3: Activity Diagram – Black Box

Shows the dishwasher's operational flow from start to finish as a "black box".

Inputs:
- Dirty Dishes
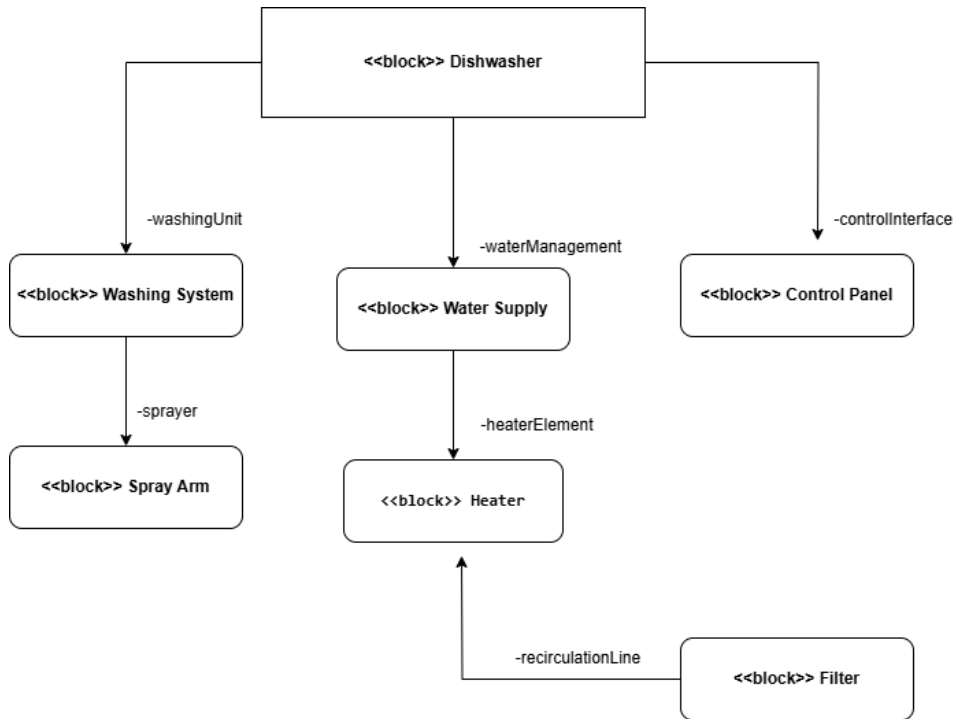- Water
- Detergent
- Electrical Power

Flow:
1. Load Dishes: Place dirty dishes in the washer.
2. Add Detergent: Add detergent.
3. Wash Dishes: Clean with water and detergent. Output: Waste Water
4. Dry Dishes: Uses power to dry. Output: Steam
5. End Cycle. Output: Clean Dishes

4. Block Definition Diagram – Input/Output Definitions

Shows how the dishwasher is structurally decomposed into subsystems and their relationships, focusing on key interfaces and flows.
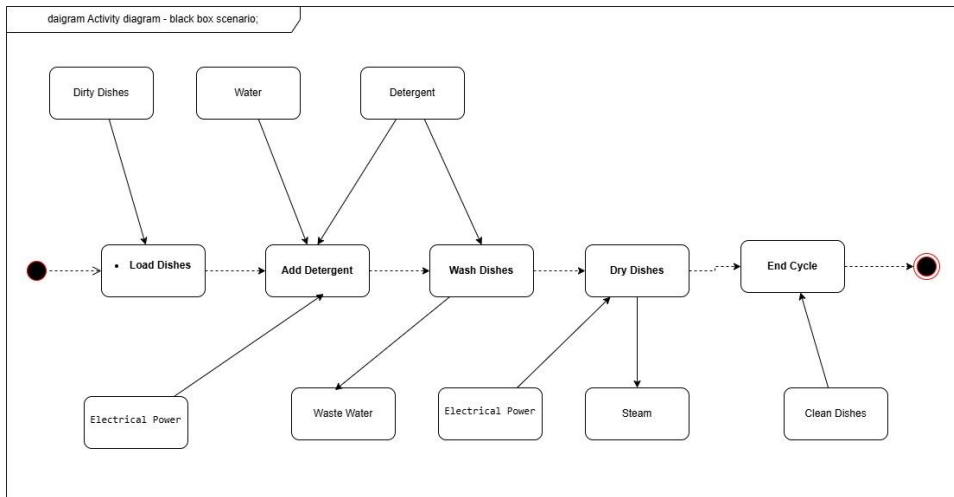
Diagram 4: BDD – Input/Output

5. Block Definition Diagram – Dishwasher Hierarchy

Shows the main system and subsystems, highlighting the architectural hierarchy.

- Dishwasher
  - Control Panel
  - Washing System (with Spray Arm, Filter)
  - Water Supply
  - Heater

Diagram 5: Dishwasher Hierarchy

daigram Activity diagram - black box scenario;

Dirty Dishes · Water · Detergent

• Load Dishes → Add Detergent → Wash Dishes → Dry Dishes → End Cycle

Electrical Power · Waste Water · Electrical Power · Steam · Clean Dishes
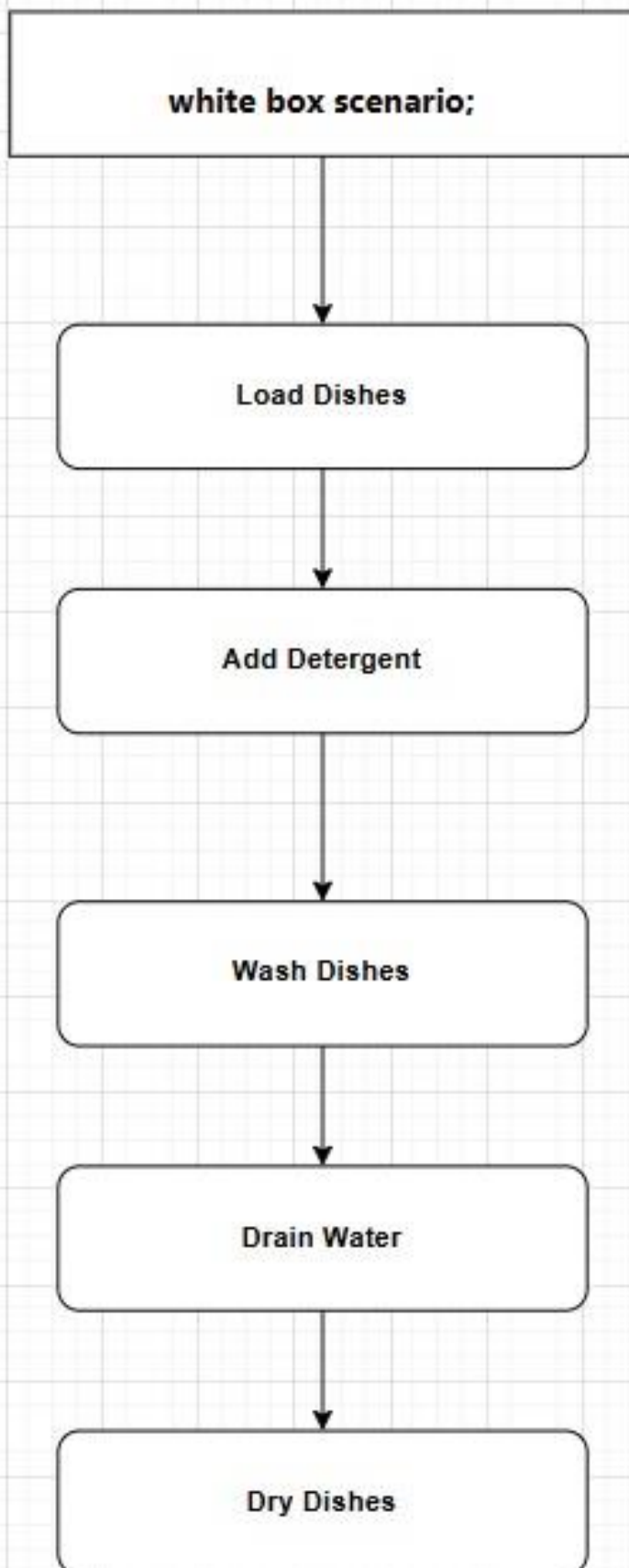
6. Activity Diagram – White Box Scenario

Shows the internal operational workflow in sequence:
1. Load Dishes
2. Add Detergent
3. Wash Dishes
4. Drain Water
5. Dry Dishes

Diagram 6: Activity Diagram – White Box

```
┌─────────────────────────────────┐
│       white box scenario;       │
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                ▼
        ┌───────────────┐
        │  Load Dishes  │
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        ┌───────────────┐
        │ Add Detergent │
        └───────────────┘
                │
                ▼
        ┌───────────────┐
        │  Wash Dishes  │
        └───────────────┘
                │
                ▼
        ┌───────────────┐
        │  Drain Water  │
        └───────────────┘
                │
                ▼
        ┌───────────────┐
        │  Dry Dishes   │
        └───────────────┘
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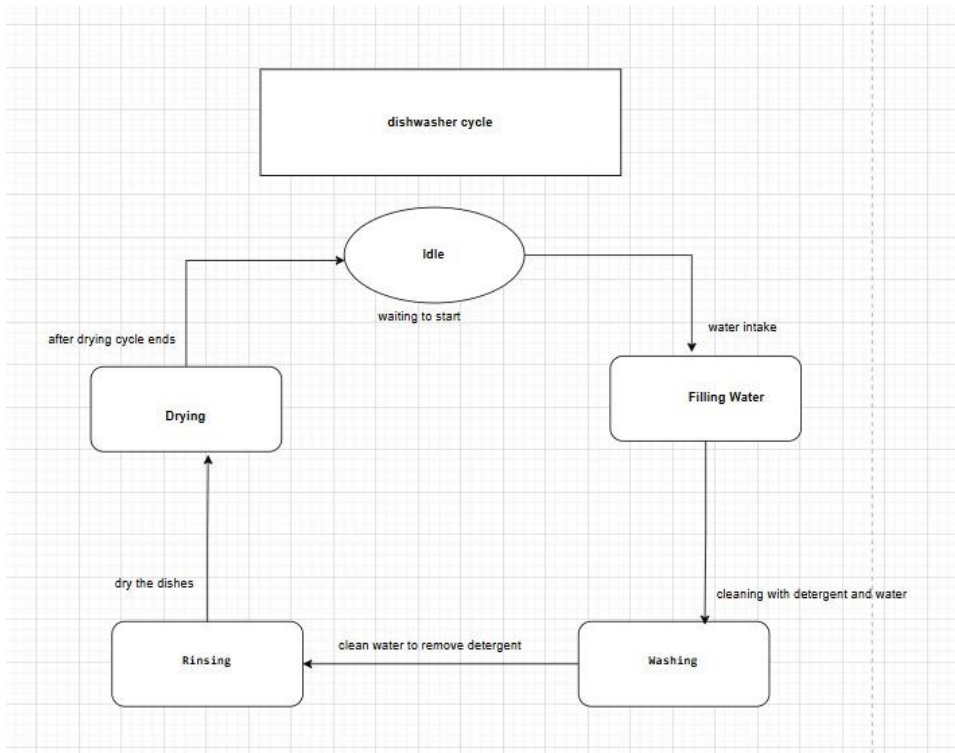
7. State Machine Diagram – Dishwasher States

Illustrates the main operational states and transitions:
Idle → Filling Water → Washing → Rinsing → Drying → Idle

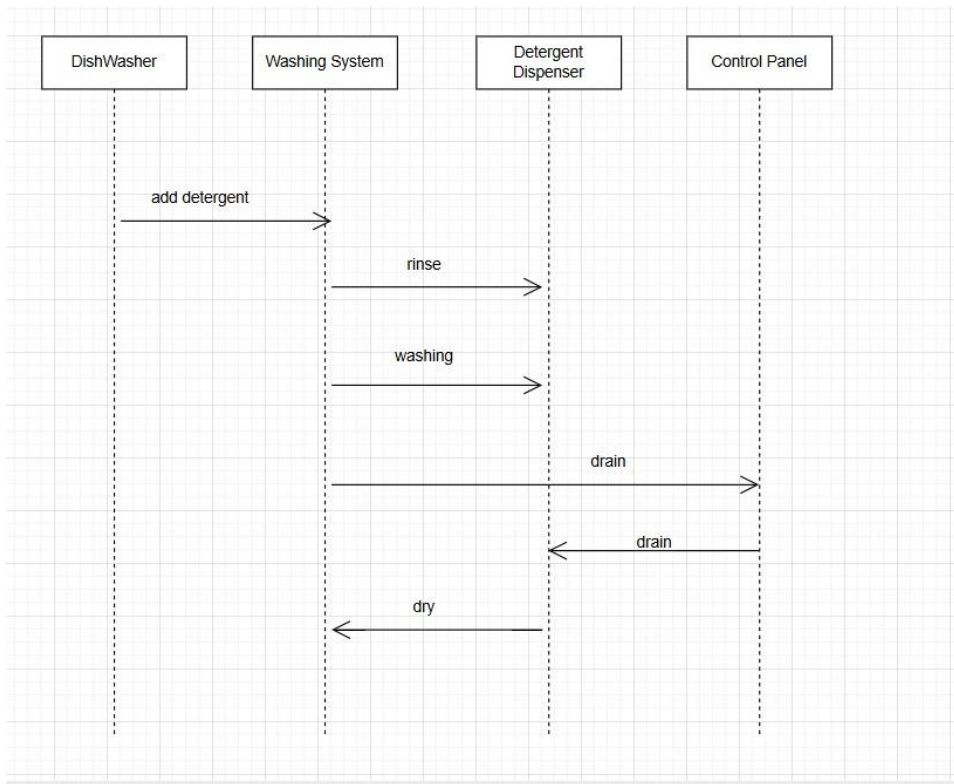Diagram 7: State Machine Diagram

8. Sequence Diagram – Interactions Between Dishwasher Parts

Shows the time-based sequence of actions between components:
- Dishwasher
- Washing System
- Detergent Dispenser
- Control Panel

Diagram 8: Sequence Diagram

Explanations of Diagrams

Block Definition Diagram (BDD):
Shows main system structure, blocks, and responsibilities. Helps understand which part does what.

Activity Diagrams:
- Black Box: Focus on input/output and overall process.
- White Box: Step-by-step flow inside the system.

State Machine Diagram:
Displays main states and how dishwasher progresses through its operation.

Sequence Diagram:
Demonstrates interaction and message flow between components in real time.