CONCEPT AGENTINTERFACE

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Status Quo: Bloated Interface

Set of unstructured, non-cohesive methods

⇒ Class AgentInterface (AI) inherits from class WorldObjectInterface (WOI)
⇒ 197 public methods concerning different fields
⇒ Some methods overridden in AI and WOI (e.g. Locate)
⇒ Or split up: SetLength in AI and GetLength in WOI
⇒ WOI contains only Getter and Locate/Unlocate
⇒ VehicleModelParameters is globally defined struct that contains vehicle specific parameters that also have individual Getters and Setters

Refactor AgentInterface

- Group related methods / Increase cohesion
- Whenever possible, declare methods with const keyword
- Specify methods unambiguously in AgentInterface code and as far as possible in names of methods, regarding:
  - Units
  - Coordinate systems

Refactor AgentInterface: Interface Segregation

- Interface segregation principle:

CLIENTS SHOULD NOT BE FORCED TO DEPEND UPON INTERFACES THAT THEY DO NOT USE.

- Specific solutions:
  - Divide interface into smaller ones and let AgentInterface inherit them by multiple inheritance
  - Reduce AgentInterface to cohesive set and create new interfaces for respective clients, where the new interfaces can inherit AgentInterface

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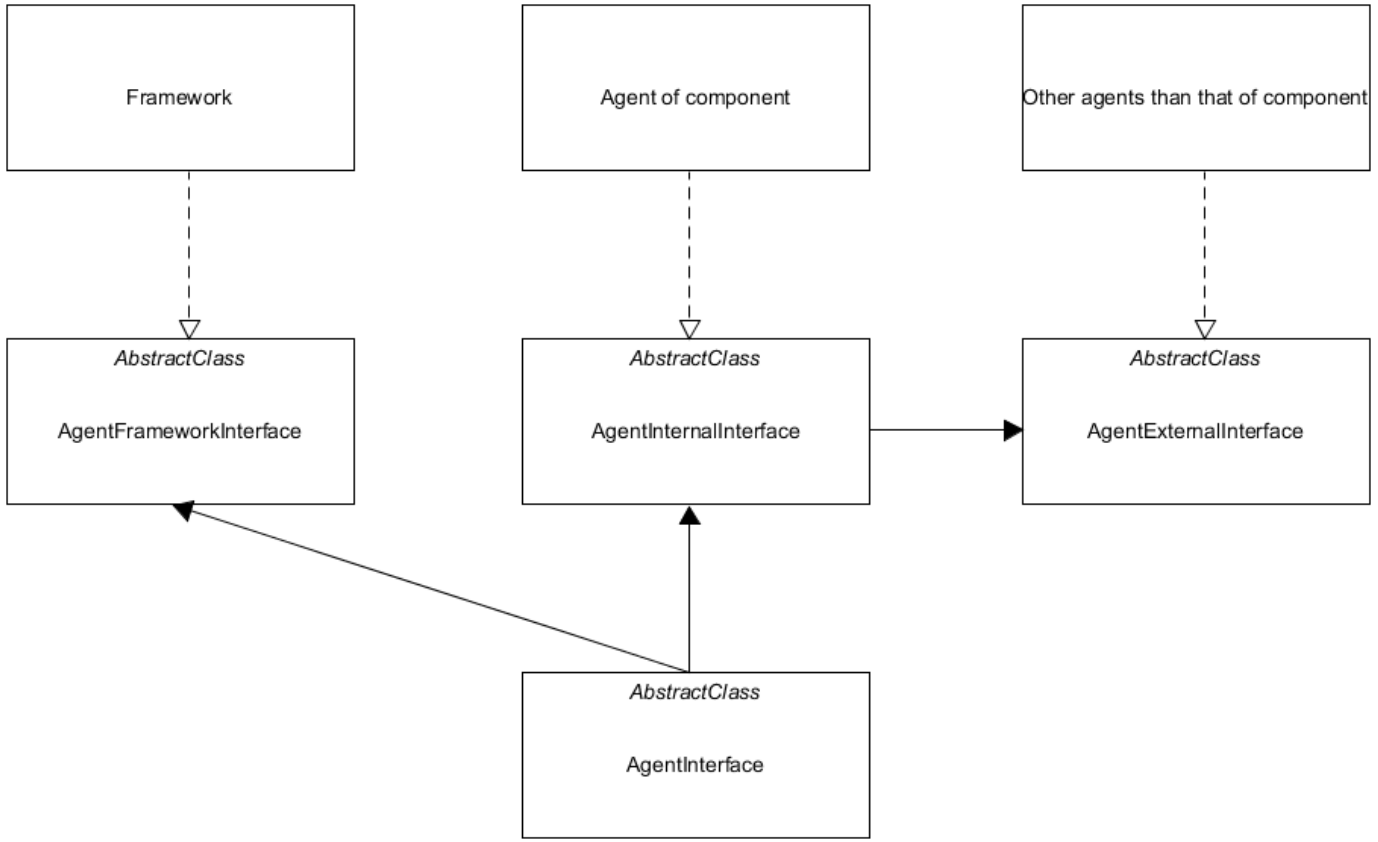
Client specific interfaces



=> Construct each client with a reference to its particular interface

Cohesive Sets: Dynamic State

```
struct DynamicState
{
   double xPos;
   double yPos;
   double yaw;

   double xVel;
   double yVel;
   double yawVel;

   double xAcc;
   double yAcc;
   double yawAcc;
};

enum class ReferenceFrame
{
   World = 0;
   AgentStaticFrame; // origin in the vehicle position (ReferencePoint), static relative to the world frame
};

enum class ReferencePoint
{
   GeometricalCenter = 0; // Center of length and width
   CenterOfMass;
   CenterOfRearAxle; // Only for vehicles
};
```

Cohesive Sets: Internal States and AgentSignals

```
struct InternalStaticState
{
   double spawnTime; // or obsolete
   std::string DriverProfileName;
   std::string AgentTypeName;
   std::string ScenarioName;
   AgentCategory agentCategory;
};

struct InternalDynamicState
{
   int gear;
   double steeringWheelAngle;
   double distanceTraveled;
   double engineSpeed;
   double speedGoalMin;
   double effAccelPedal;
   double effBrakePedal;
};

struct AgentSignals
{
   IndicatorState indicatorstate;
   LightState lightstate;
   bool brakeLight;
   bool horn;
   bool headlight;
   bool highBeamLight;
   bool flasher;
};
```

Process of extending interfaces

Extend without modification (Open-Closed Principle)

- Adapter Pattern, Visitor Pattern, …