

# Lecture 07

# Types of Agent Programs

Artificial Intelligence

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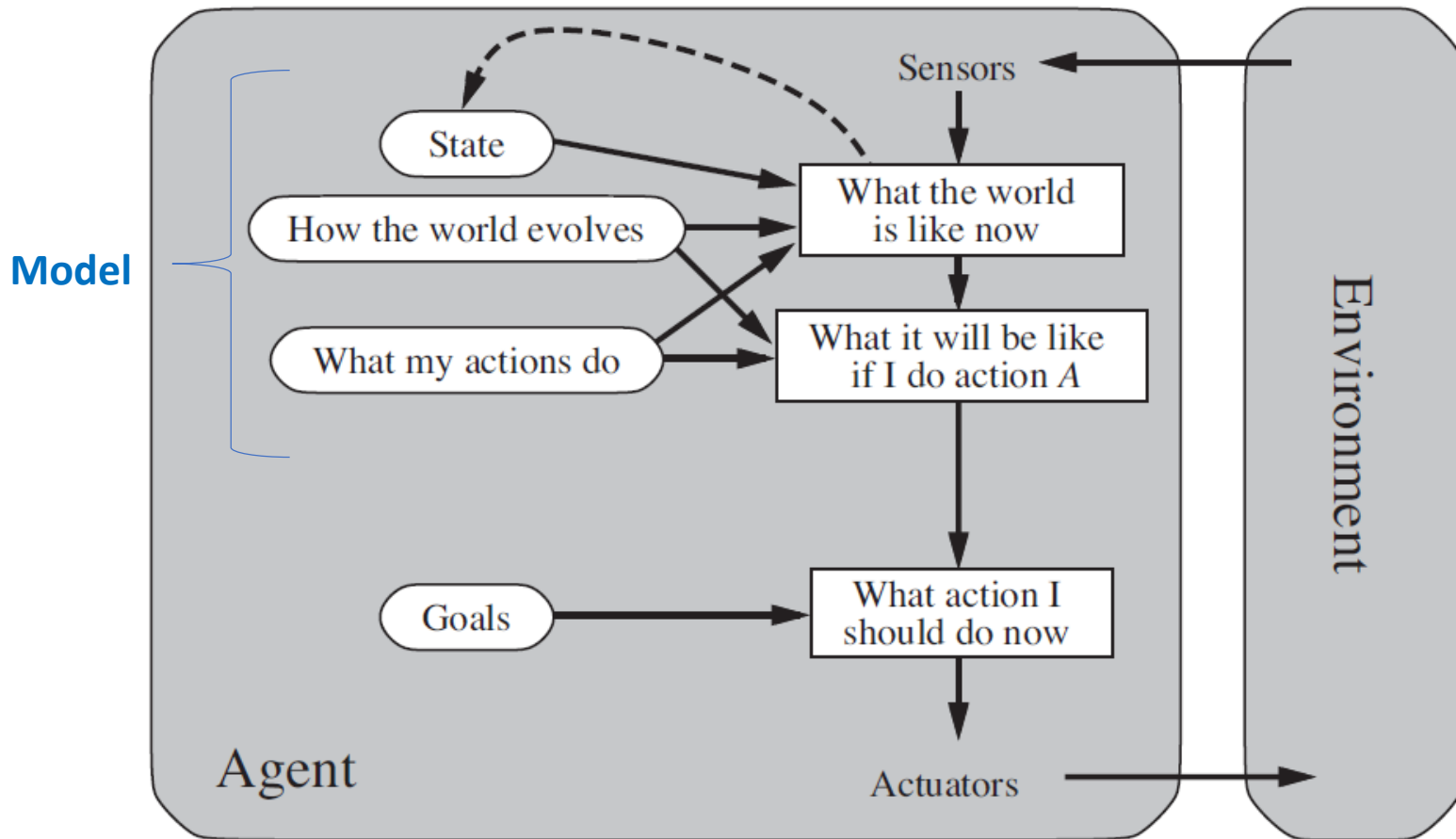
# Today's Agenda

- Goal-based Agents
- Utility-based Agents
- Learning Agents

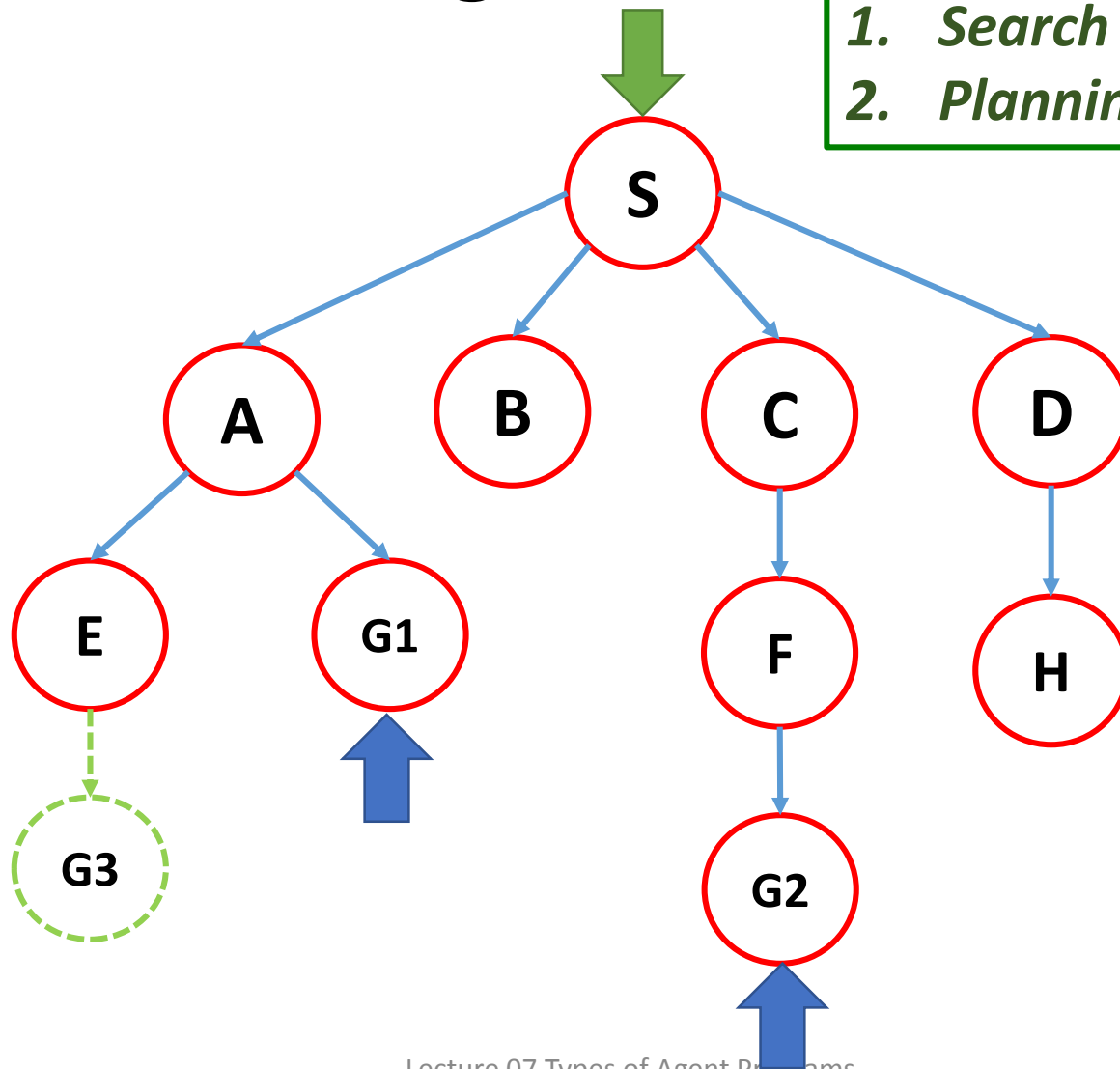
# Goal Based Agents

- Expansion of Model Based Reflex Agent
- Desirable situation -> **GOAL**
- Searching & Planning

# Goal-based Agents



# Goal Based Agent



# Goal-based Agents

- A goal-based agent has flexibility to adjust its actions based on successfully reaching a **goal**
  - Goal based agent chooses its actions in order to achieve goals
  - Considers the future actions
  - Uses goal information to select between possible actions in the current state
- Example:
  - A GPS system finding path to a certain destination.

# Contd...

- The agent needs some sort of **goal** information that describes situations that are desirable
  - Instead of having predefined Condition-Action rules for choosing the actions,
  - Agent should choose the action that best aligns with his **Goal**.

# Goal-based Action Selection

- Achieving the goals can take 1 action or many actions.
  - Their every action is intended to reduce its distance from the goal
- Actions chosen → goals, based on
  - the current state
  - the current percept
- Goal-based action selection
  - Straightforward
    - When goal satisfaction results immediately from a single action
  - Tricky
    - when the agent has to consider long sequences of twists and turns in order to find a way to achieve the goal



# Action Sequence

- Two aspects of finding action sequence are:
  - Searching
  - Planning
- These help agent in achieving goal.

# Reflex Agents vs Goal Based Agents

- The reflex agents just have an automated response for certain situations. (**Condition-Action Rules**)
- Unlike reflex agents before acting this agent **reviews many actions** in order to achieve its **goals**
- Which is computationally expensive?
  - Goal Based
- Which is more flexible?
  - Goal Based

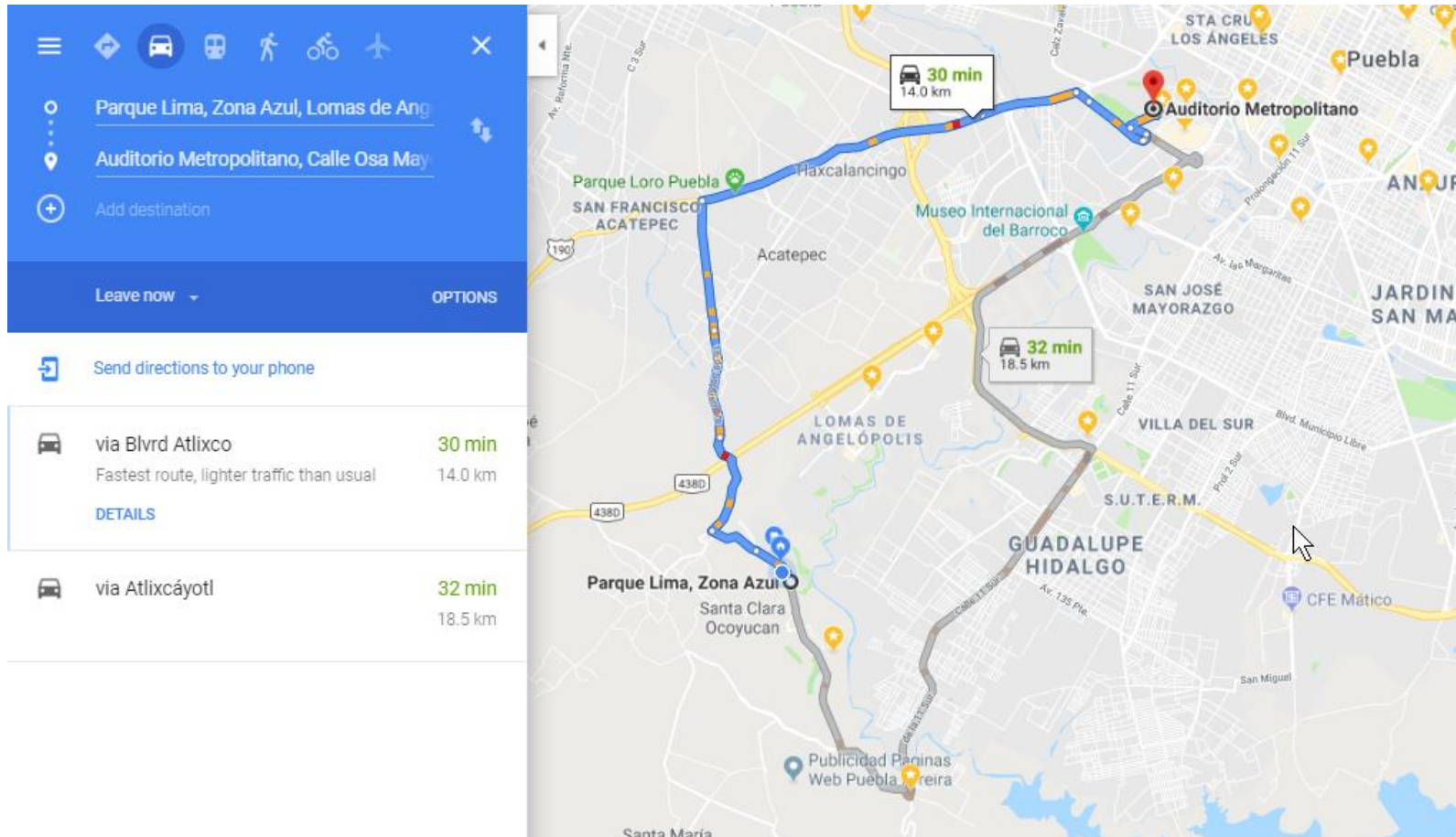
# Smart Warehouse



# Utility-based Agents

- Goals alone are not enough to generate **high-quality** behavior in most environments
  - Goals just provide a crude binary distinction between “happy” and “unhappy” states.
- Many action sequences will get the taxi to its destination
  - But some are quicker, safer, more reliable, or cheaper than others
- **Performance measure** assigns a score to any given sequence of environment states

# Google map



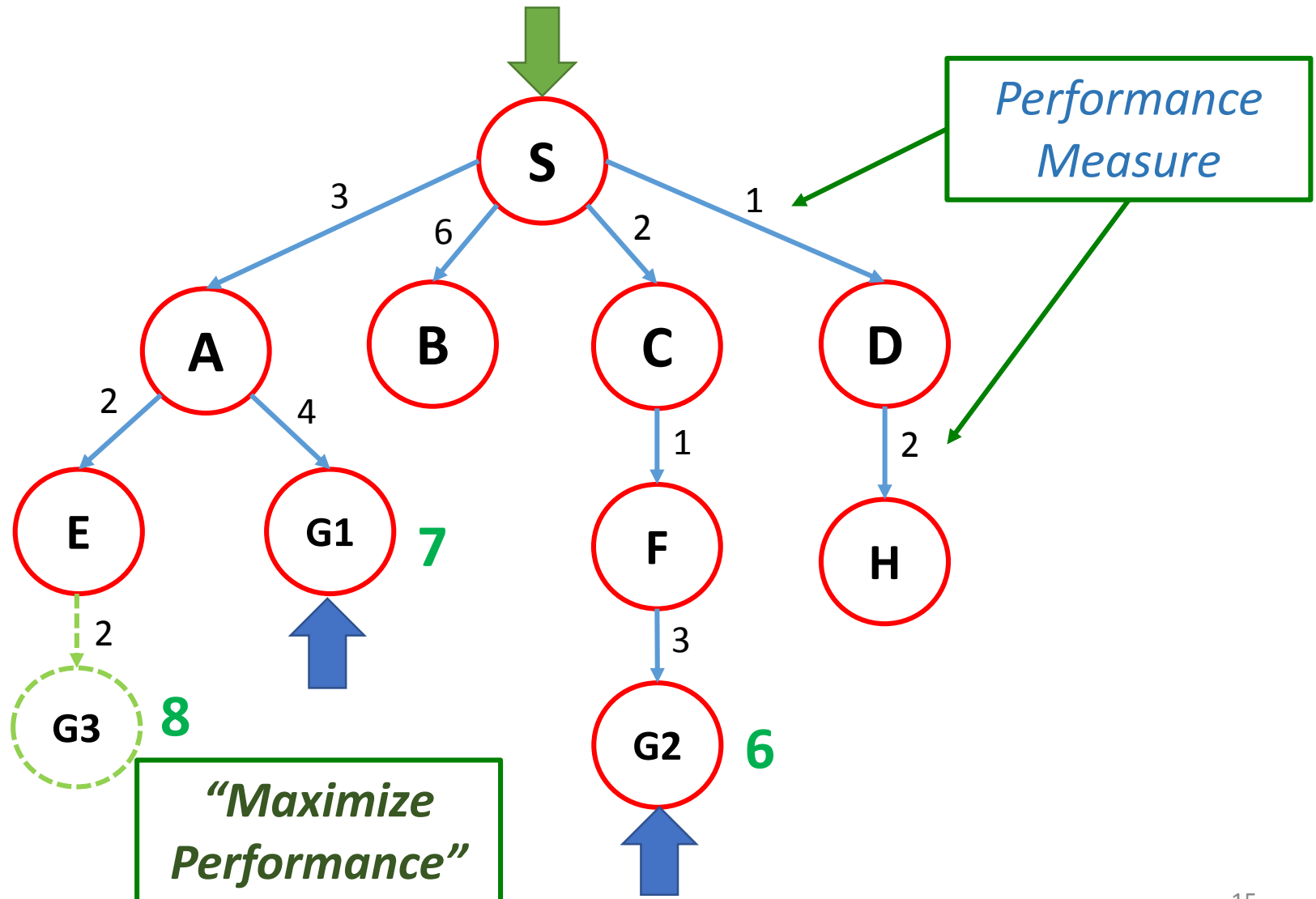
# Utility-based Agents

- Utility agents provide the solution which **maximizes** the **performance measure**

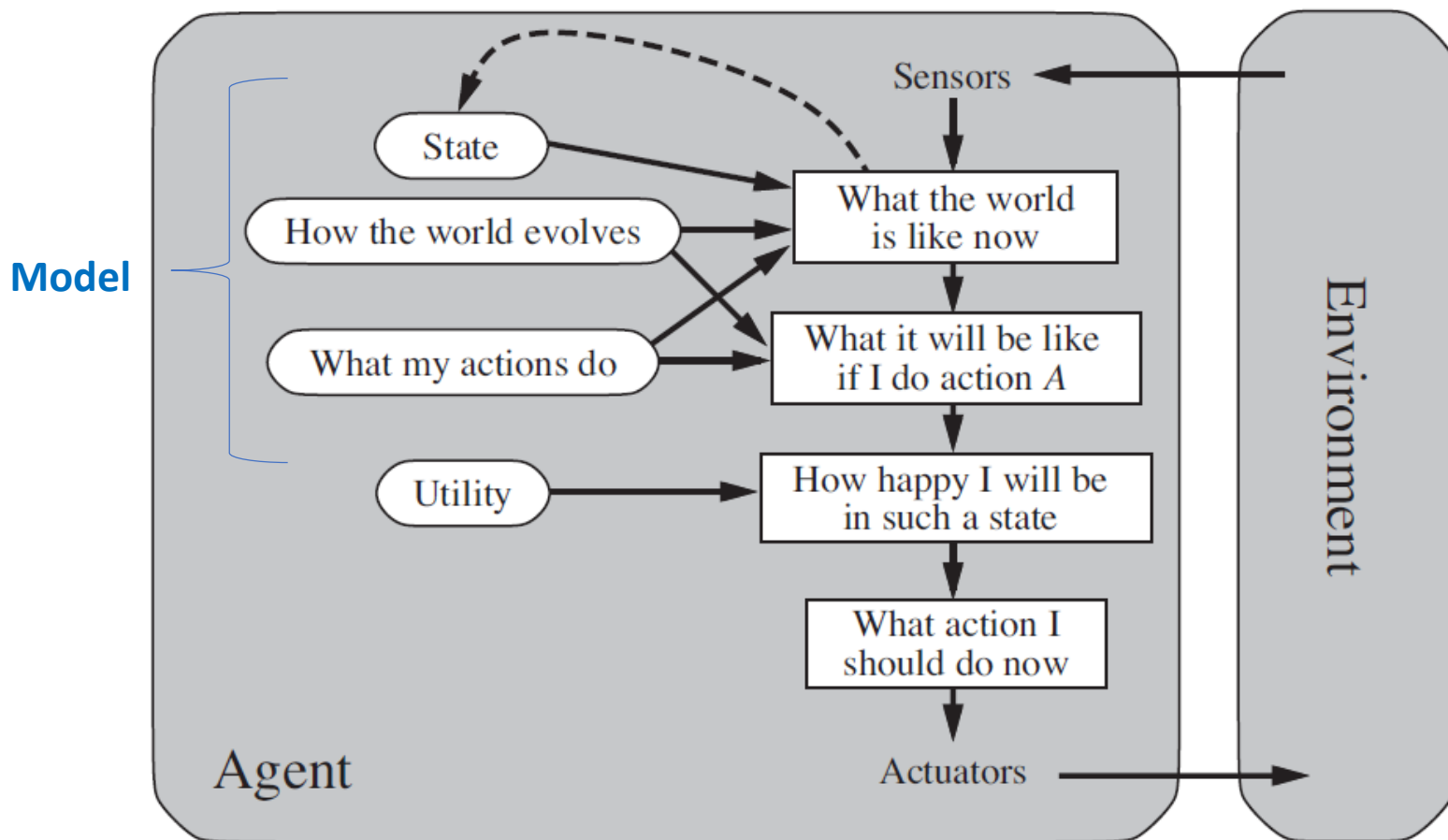
OR

- A **utility-based agent** is an **agent** that acts **based** not only on what the goal is, but the **best way** to reach that goal.

# Utility Based Agents



# Utility-based Agents





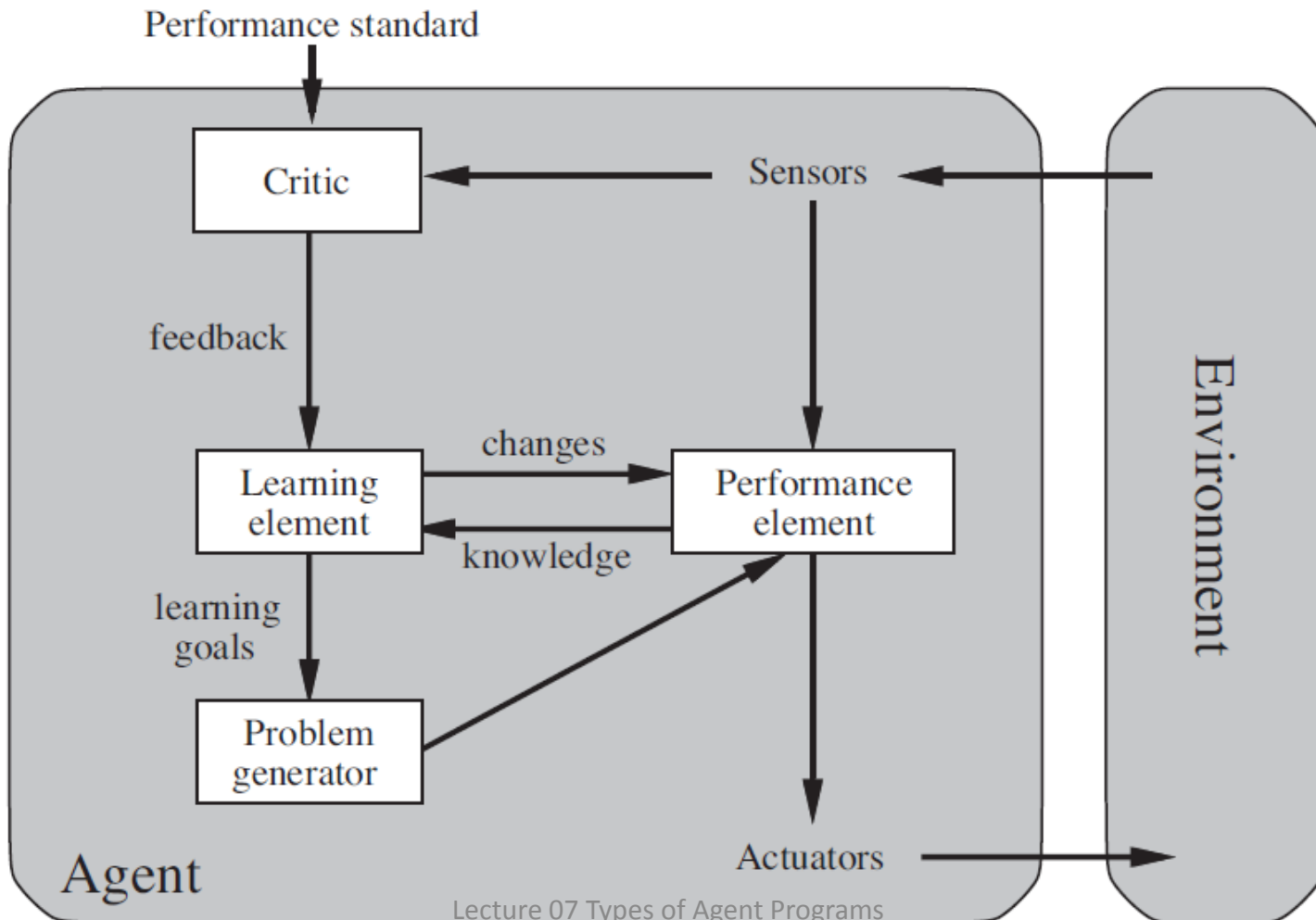
# Utility Agents vs Goal-based Agents

- Difference
  - Goal-based agents have **several** action sequences which all satisfy it's goals
  - Whereas utility agent performs the most **effective** set of actions
- Common
  - Goal

# Learning Agents

- After an agent is programmed, can it work immediately?
  - No, it still need teaching
- In AI,
  - Once an agent is done
  - We teach it by giving it a set of examples
  - Test it by using another set of examples
- We then say the agent learns
  - A learning agent

# Learning Agent



# Learning Agents

- Four conceptual components
  - Learning element
    - Making improvement
  - Performance element
    - Selecting external actions
  - Critic
    - Tells the Learning element how well the agent is doing with respect to fixed performance standard.  
(Feedback from user or examples, good or not?)
  - Problem generator
    - Suggest actions that will lead to new and informative experiences.