Lecture 07
Types of Agent Programs

Artificial Intelligence

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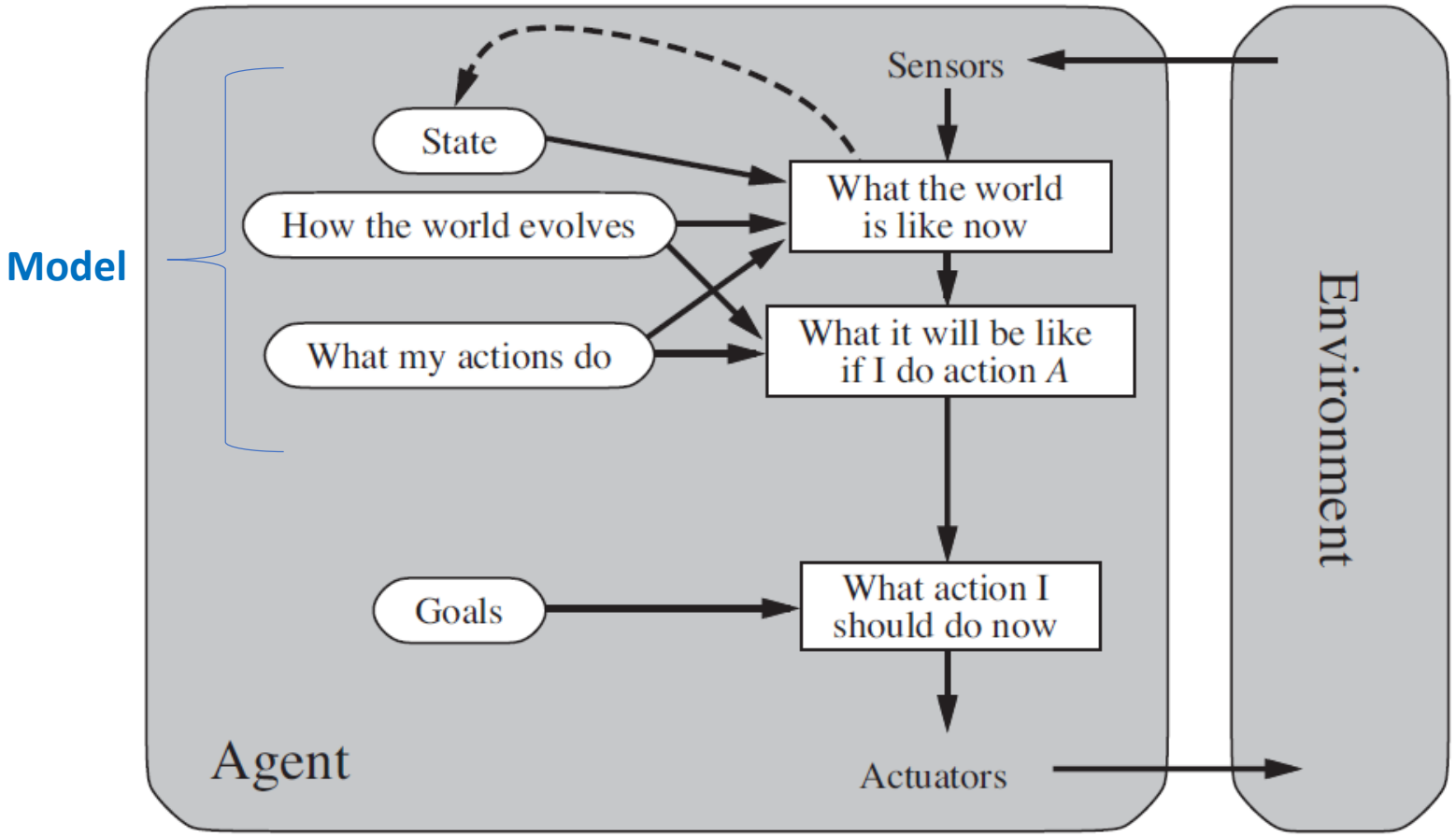
Today's Agenda

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

Goal Based Agents

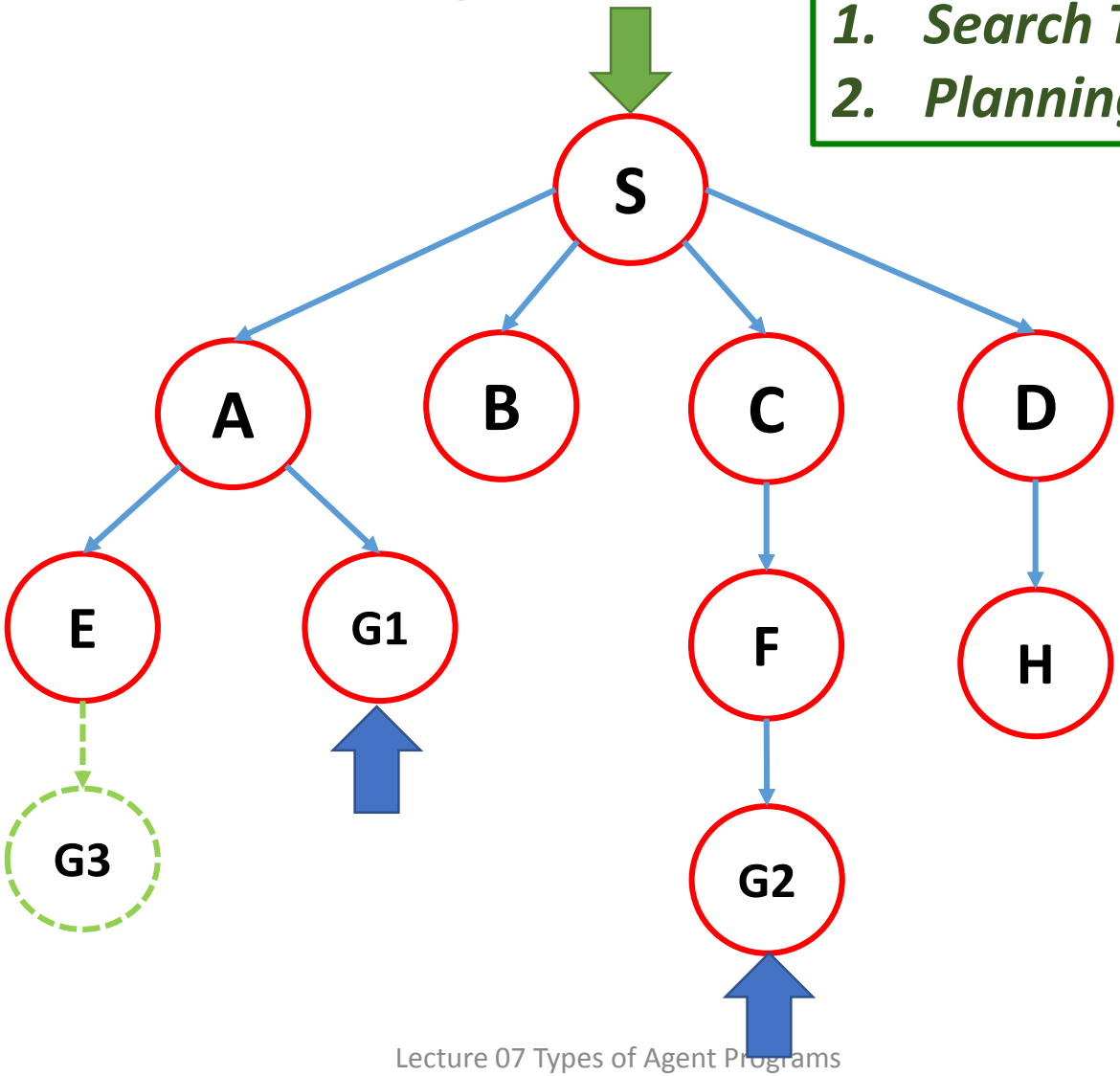
- Expansion of Model Based Reflex Agent
- Desirable situation -> GOAL
- Searching & Planning

Goal-based Agents



Goal Based Agent

1. *Search Technique*
2. *Planning*



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

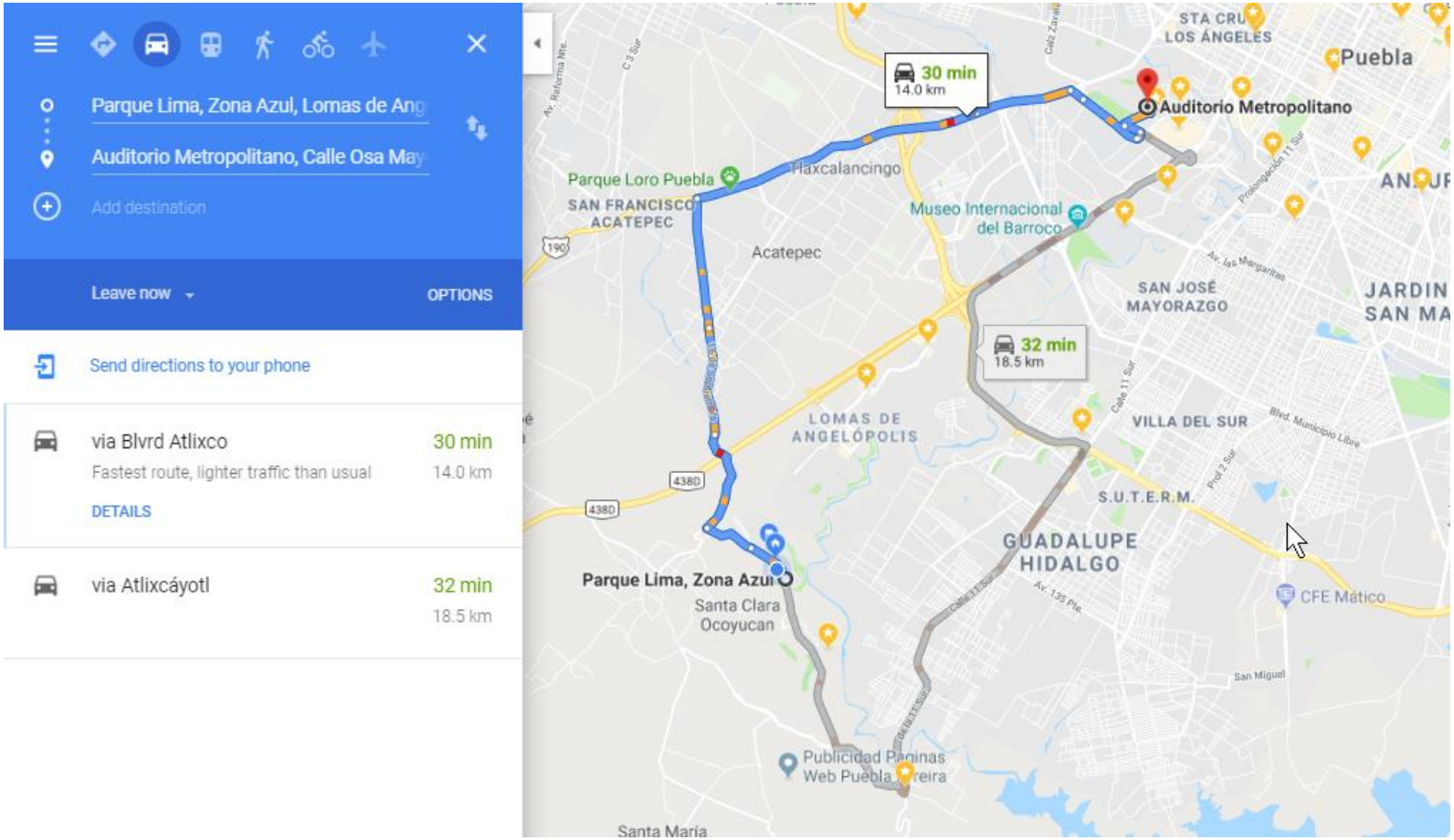
- The reflex agents just have an automated response for certain situations. (Condition-Action Rules)
- Unlike reflex agents before acting this agent reviews many actions in order to achieve its goals
- Which is computationally expensive?
  - Goal Based
- Which is more flexible?
  - Goal Based

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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Auditorio Metropolitano, Calle Osa May
Add destination
Leave now
OPTIONS
Send directions to your phone
via Blvrd Atlixco
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Fastest route, lighter traffic than usual
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DETAILS
via Atlixcáyotl
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32 min
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Auditorio Metropolitano
Puebla
Parque Loro Puebla
SAN FRANCISCO ACATEPEC
Tlaxcalancingo
Acatepec
Museo Internacional del Barroco
SAN JOSÉ MAYORAZGO
LOMAS DE ANGELÓPOLIS
VILLA DEL SUR
S.U.T.E.R.M.
GUADALUPE HIDALGO
CFE Mático
Parque Lima, Zona Azul
Santa Clara Ocoyucan
Publicidad Páginas Web Puebla
Santa María

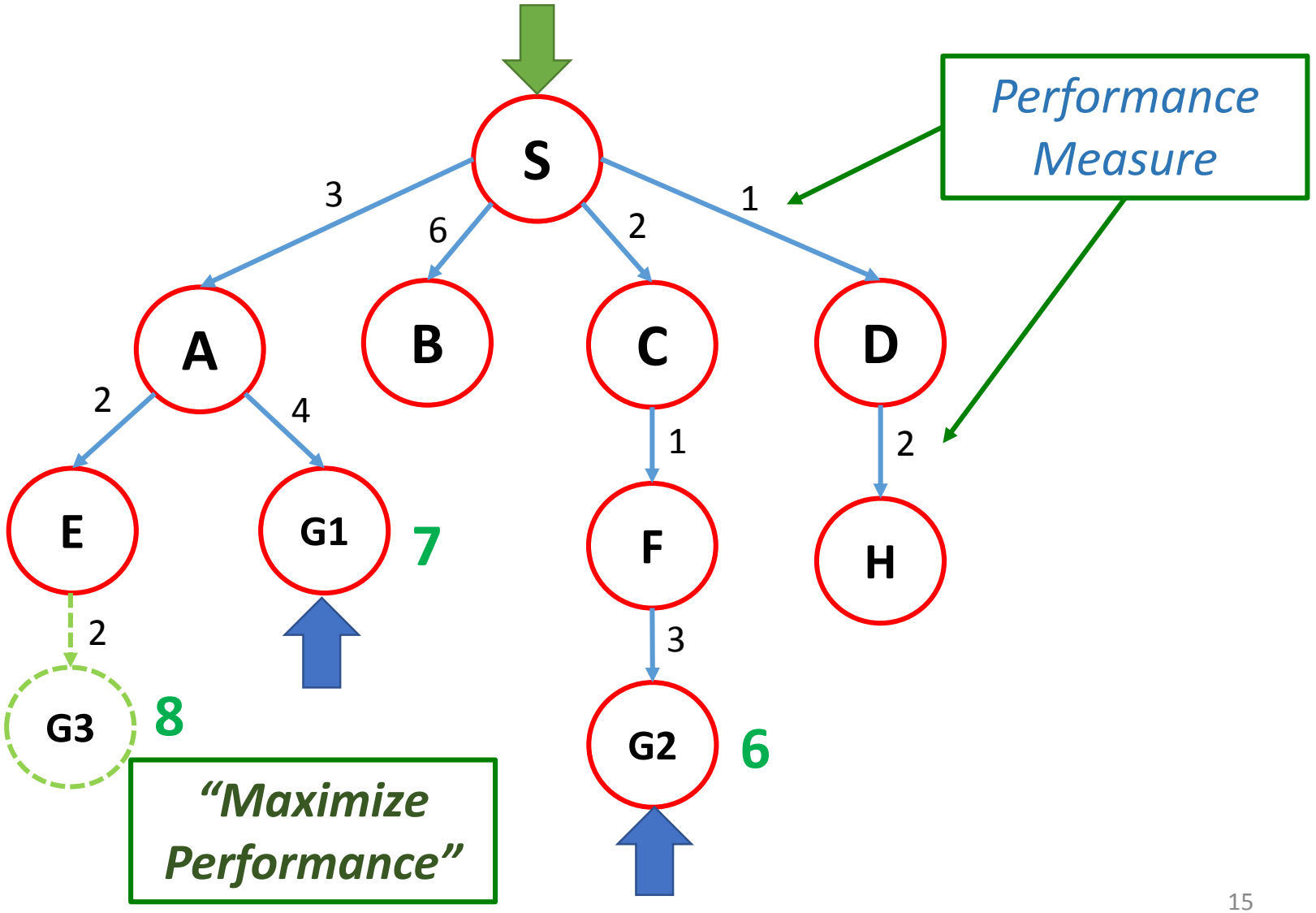
Utility-based Agents

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

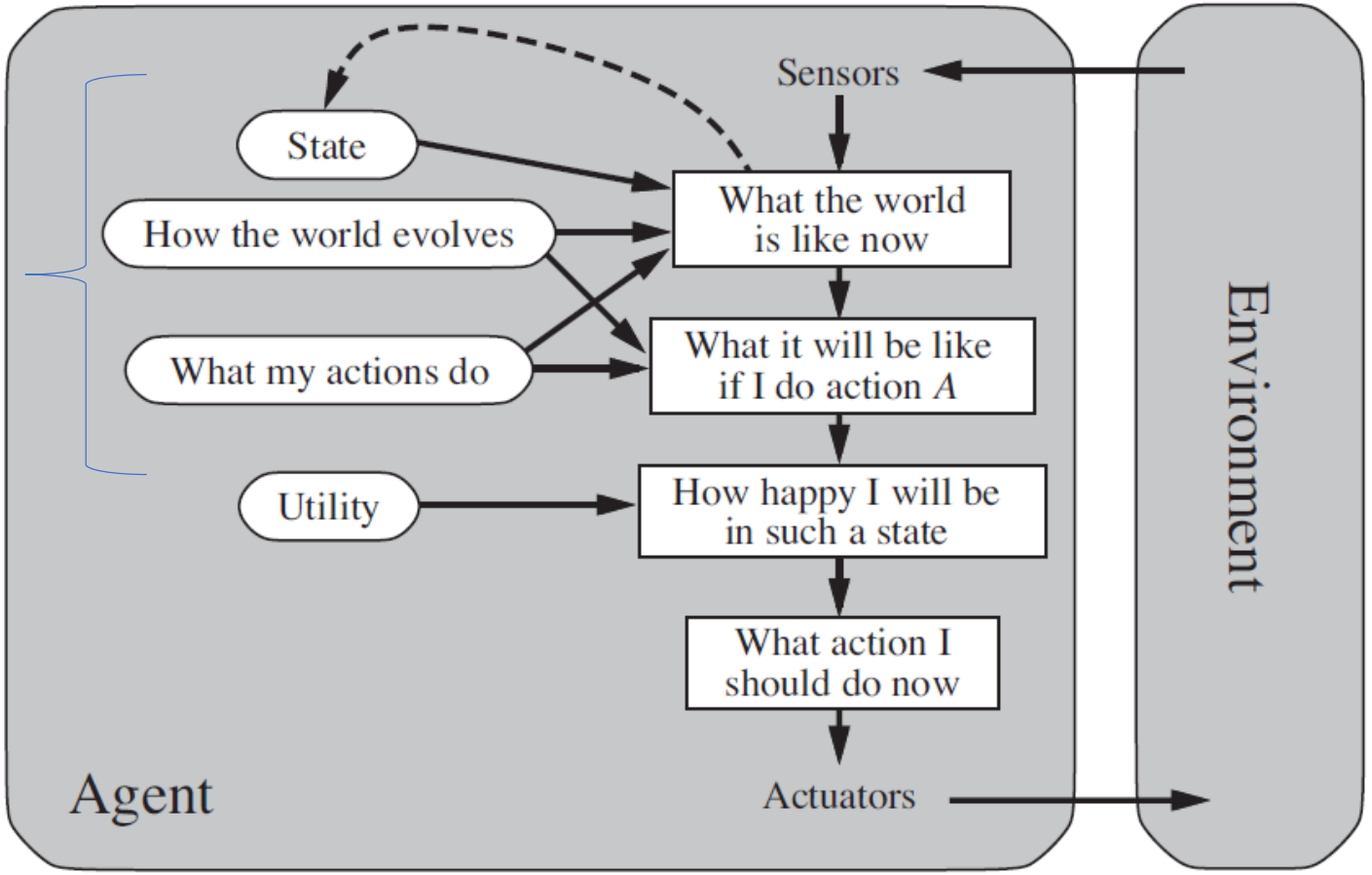
OR

- 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



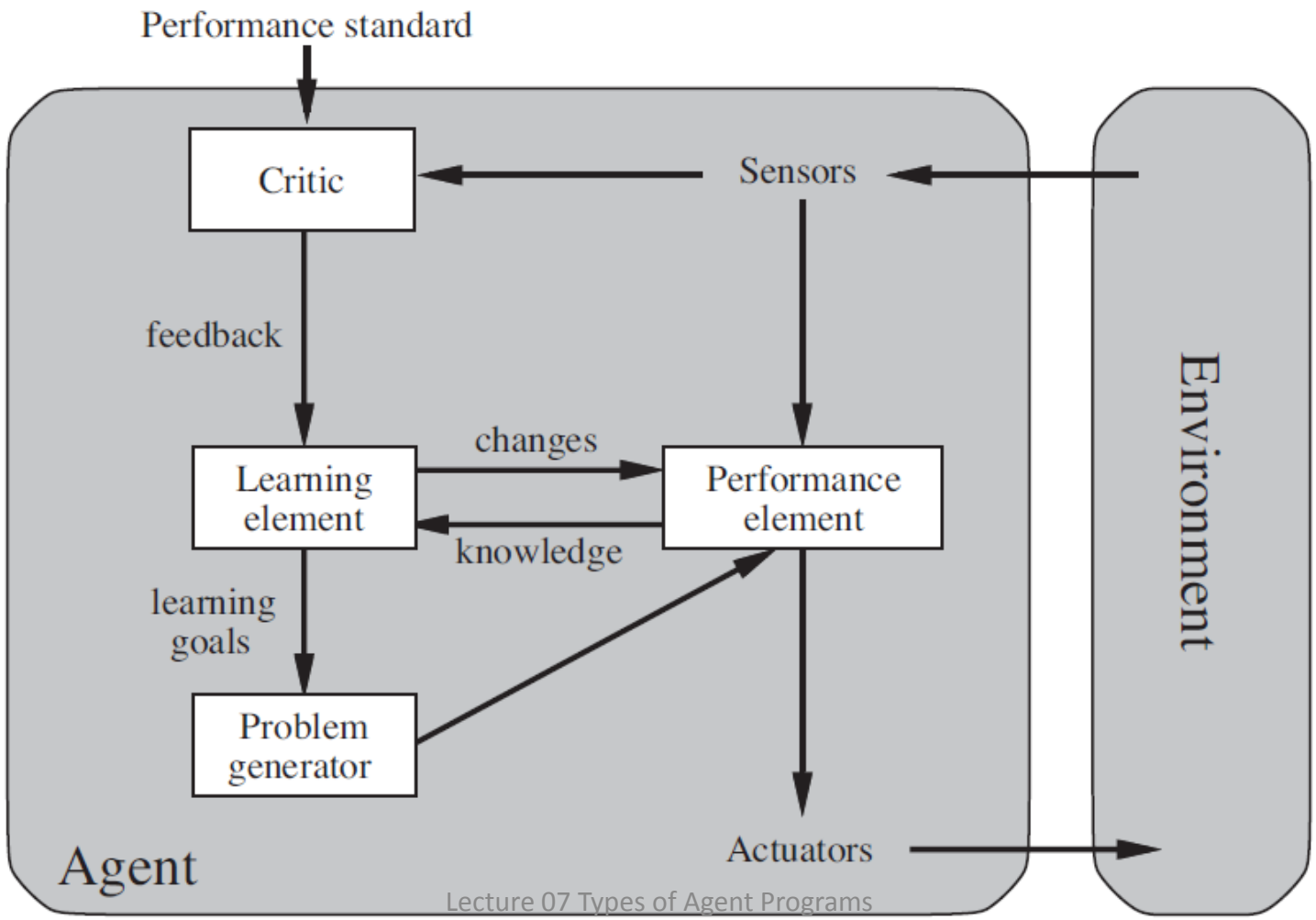
Utility Agents vs Goal-based Agents

- 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.