Lemming
A Tool
for
Guided
Selection
of Plans

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FOR TWO SCORE YEARS, THE PLANNING COMMUNITY WAS SATISFIED WITH PRODUCING A SINGLE SOLUTION TO A PLANNING TASK. IT WAS THE AGE OF OPTIMAL PLANS. IT WAS THE AGE OF DARKNESS. FOR GOD HAD MADE THE USER IN THEIR OWN IMAGE, AND THE USER WORKED IN MYSTERIOUS WAYS.

UNTIL IT WAS SAID UNTO THE MERRY PEOPLE OF ICAPS: "WE MUST BE ABLE TO PRODUCE MULTIPLE PLANS, TOP-K PLANS, DIVERSE PLANS... ANY PLANS THAT THE HEART MAY DESIRE. OUR DOMAINS MAY BE INCOMPLETE, AND PDDL CAN ONLY DO SO MUCH, BUT PLAN WE MUST."

BUT THE USER WAS NOW FLOODED WITH MANY A GROSS PLANS AND KNEW NOT WHAT TO MAKE OF THEM. THERE WAS MUCH FRUSTRATION AND GNASHING OF TEETH.

THERE WAS NO PEACE.

EVEN SO, FACED WITH SUCH INSURMOUNTABLE ODDS, OUR LITTLE GROUP AT IBM WILL NOT BE DAUNTED. WE CALLED UPON LANDMARKS, THE ANGEL OF NECESSITY, TO SHOW US LIGHT.

AND LO AND BEHOLD, BEFORE THE SUN WOULD RISE ON THE NEXT ICAPS, A NEW LEGEND WAS BORN. A TOOL THAT CAN GUIDE THE USER THROUGH A FOREST OF STATES AND ACTIONS USING DISJUNCTIVE ACTION LANDMARKS.

HEREIN LIES THE PLAN DISAMBIGUATION TASK.

Interfacing multiple plans to an end user is necessary because not all user preferences + domain constraints are known up front, or even if they are known, cannot be represented in the input to a solver.

However, as the number of viable solutions increase, users need guidance to navigate the set of alternative plans while optimizing for two criterions: time to selection and quality of selection.

Landmarks as a means of Disambiguation 😄

Disjunctive action landmarks offer an intriguing option for guided disambiguation since they cover choice points that must be resolved to arrive at a single desired plan.

Selection View

Focus greedily on selection of disjunctive action landmarks to make the most disambiguating choices.

Whittle down set of plans by committing to one or more landmarks.

FAQs

Q: Why is it called Lemming?
A: No one knows. ☹

Q: Can we use it?
A: Yes! We are open source: https://github.com/IBM/lemming.

Build View

Build a plan from scratch when selection view becomes too large.

BUILD
FORWARD
from the
initial state

BUILD
BACKWARD
from the
goal state

Note that, while the Lemming UI has a dominant visual component, the presentation of disambiguation options can happen through language, or through other means like selection of options, depending on the mode of delivery of the underlying software.

AAAI 2020
Disambiguation of skills during execution in a goal-oriented conversational agent.
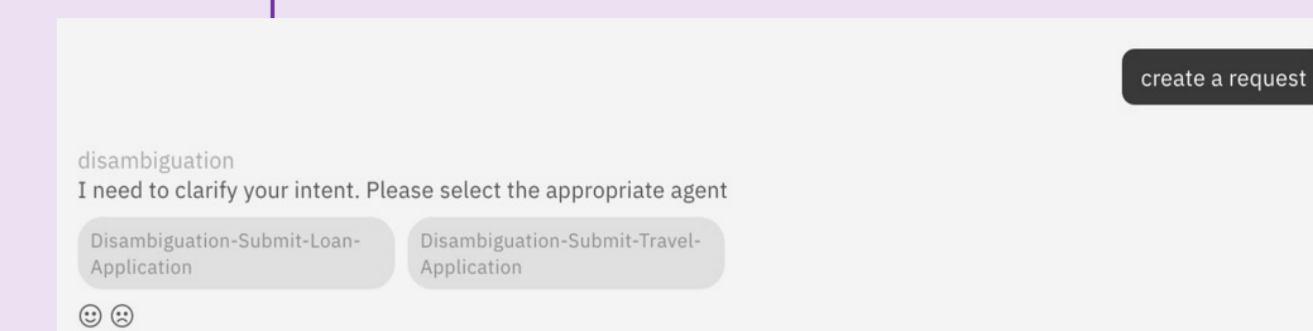
A Unified Conversational Assistant Framework for Business Process Automation. Yara Rizk, Abhisekh Bhandwalder, Scott Boag, Tathagata Chakraborti, Vatche Isahagian, Yasaman Khazaeni, Falk Pollock, and Merve Unuvar. AAAI 2020 Workshop on Intelligent Process Automation.
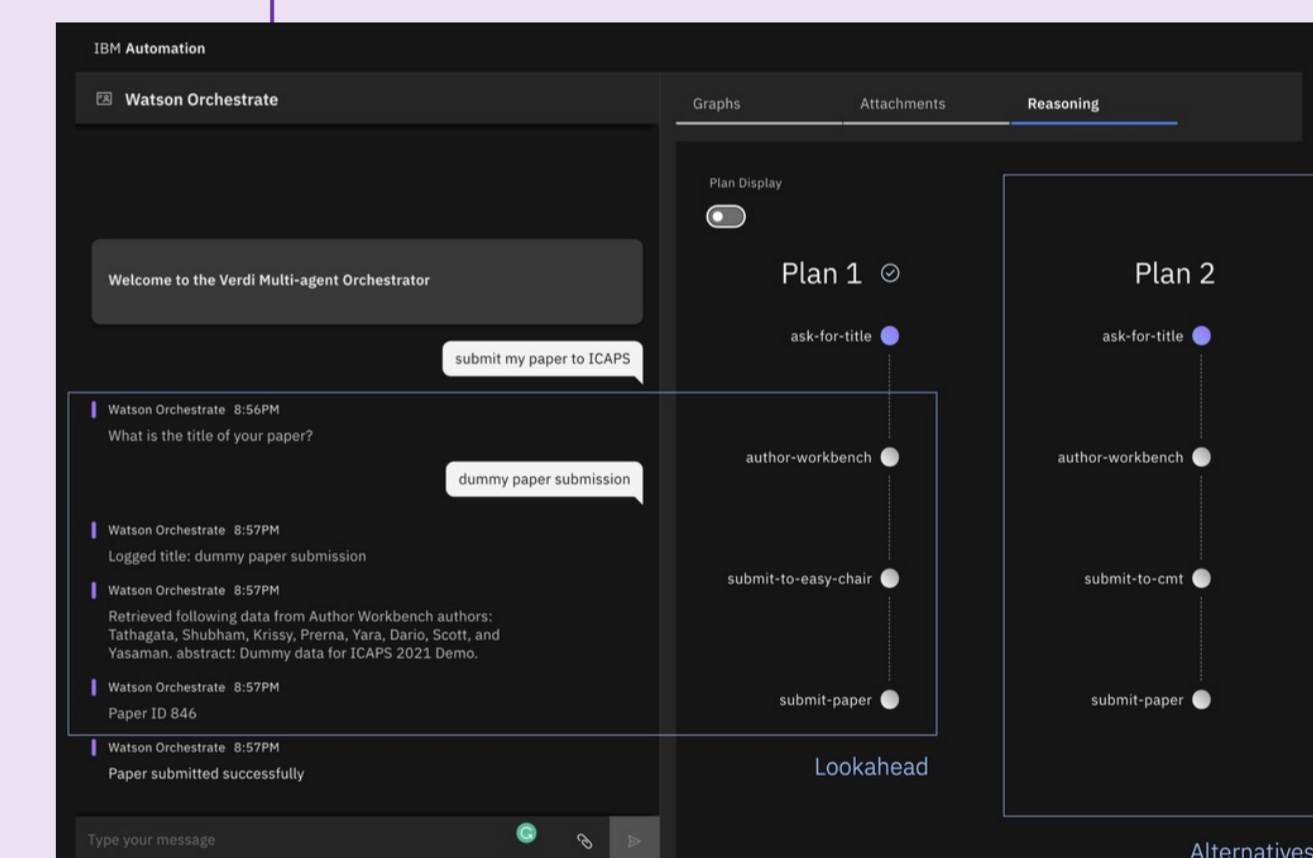
ICAPS 2020
Using landmarks to summarize internal plans of a goal-oriented conversation agent.
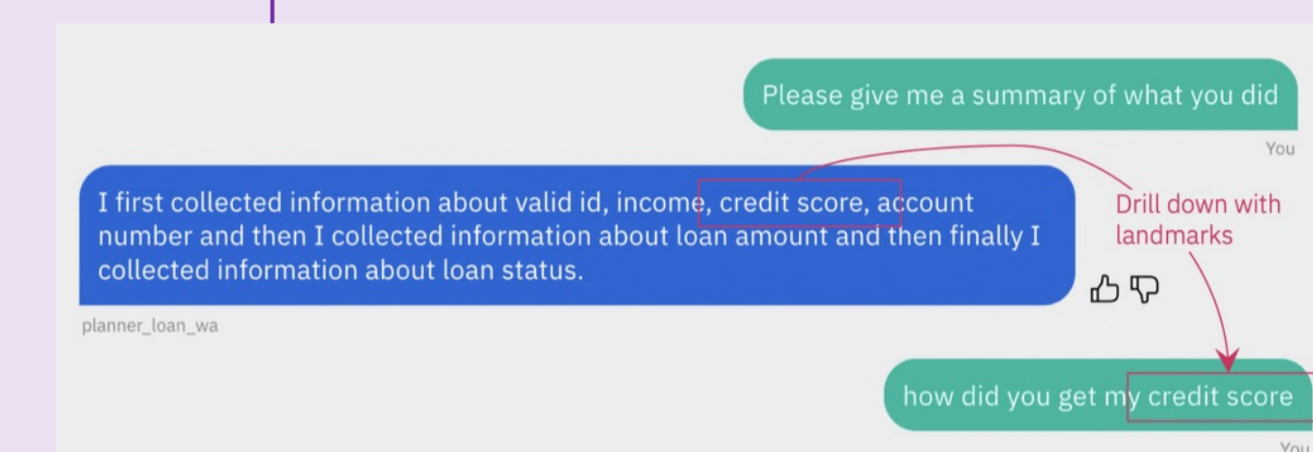
Explainable Composition of Aggregated Assistants. Sarath Sreedharan, Tathagata Chakraborti, Yara Rizk, and Yasaman Khazaeni. ICAPS 2020 Workshop on Explainable AI Planning.
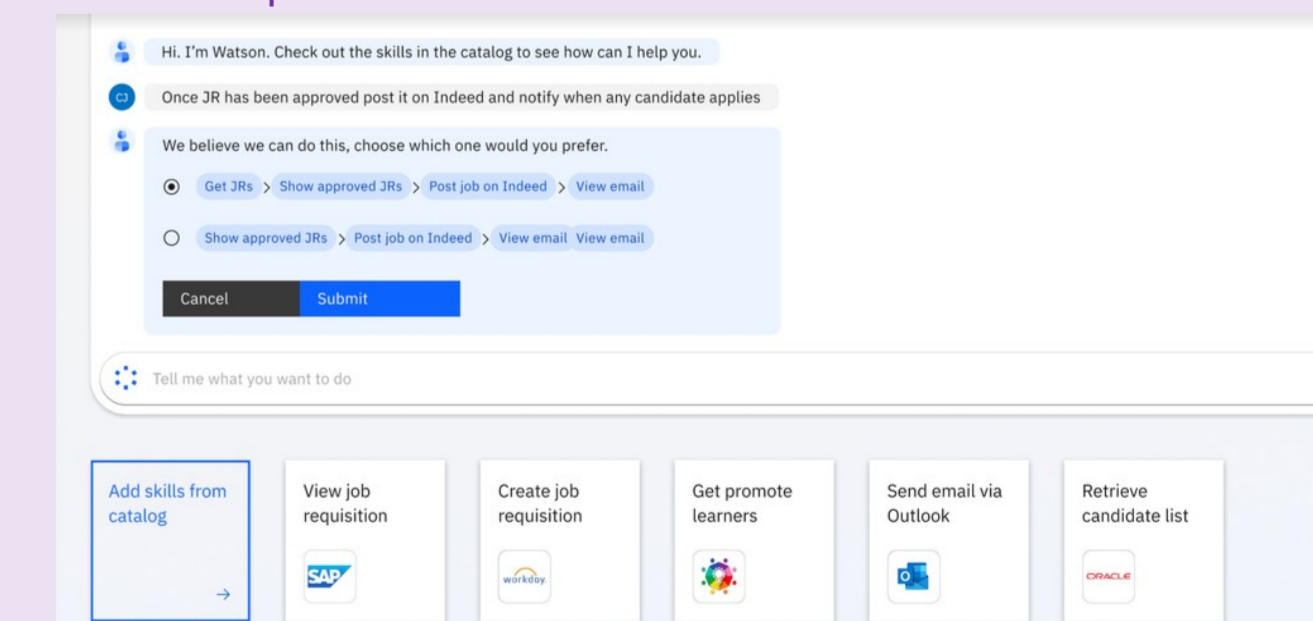
ICAPS 2021
Visualization of multiple alternative plans in a goal-oriented conversational agent.

Planning for Automated Composition of Aggregated Assistants. Tathagata Chakraborti, Shubham Agarwal, Krissy Brimijoin, Prerna Agarwal, Yara Rizk, Dario Silva Moran, Scott Boag, and Yasaman Khazaeni. ICAPS 2021 Demonstration.
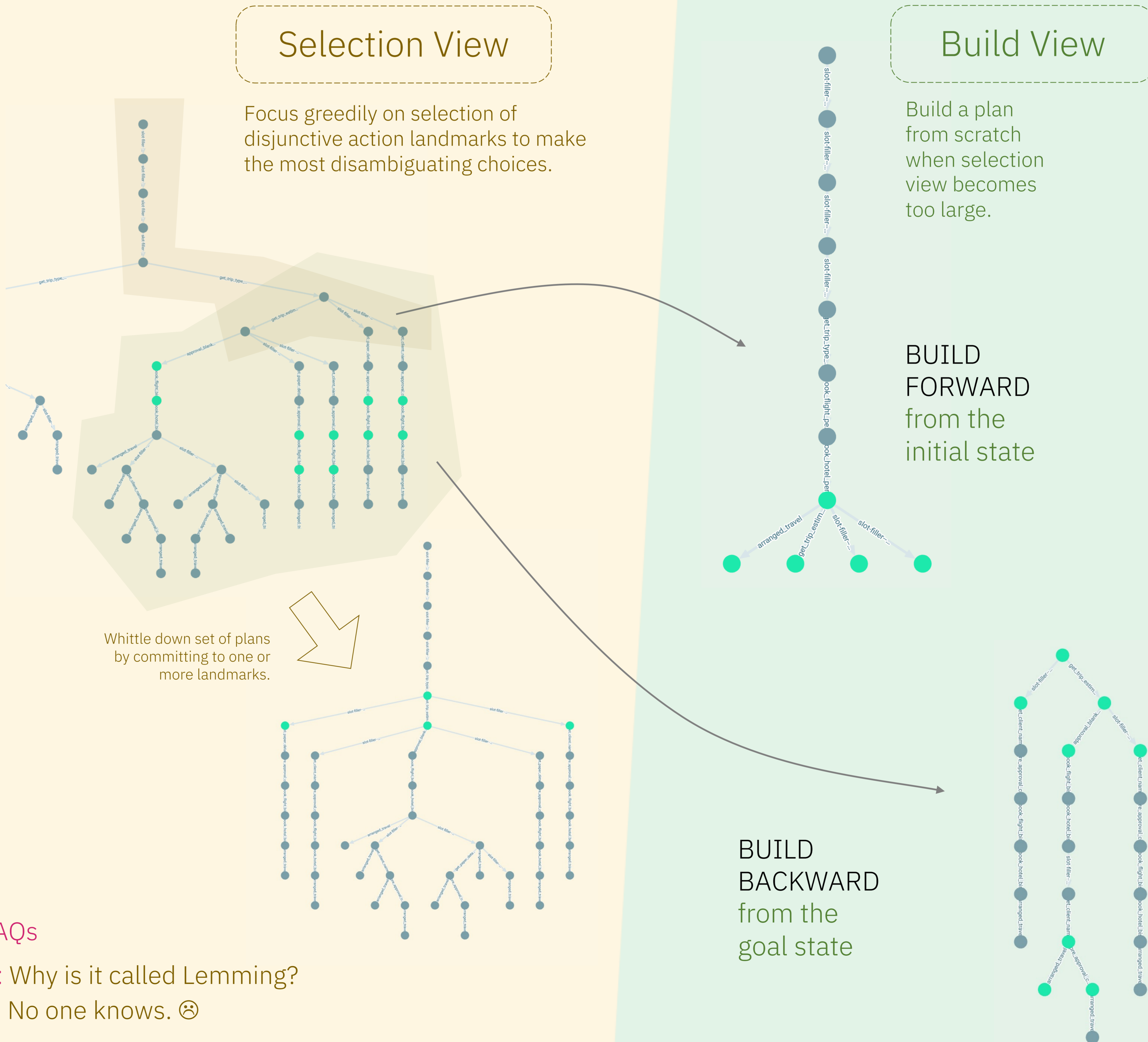
Think 2023
Presenting multiple plans as a whole as part of a goal-oriented conversation.

ICAPS 2023
Disambiguating alternative plans using landmarks.