AWS re:Invent

ALX316-R

Alexa Conversations

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Agenda

Amazon Alexa skills

One-shot vs. multi-turn

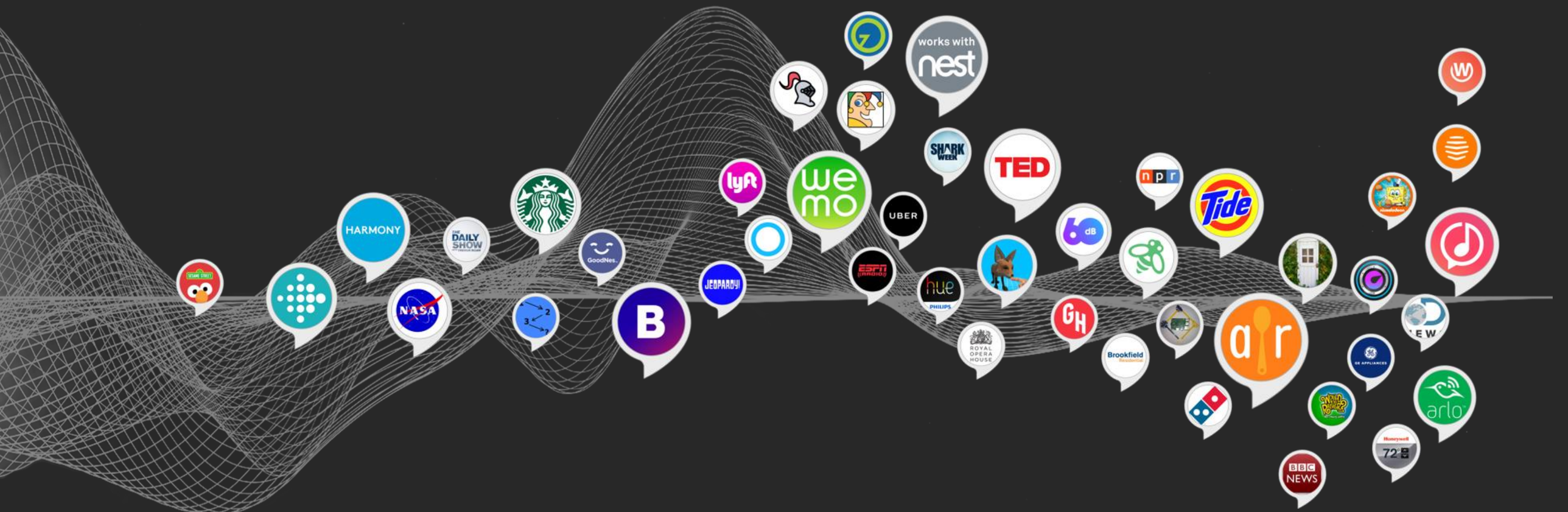
Dialog management (DM)

Building Pet Match with AI-driven DM

Alexa skills

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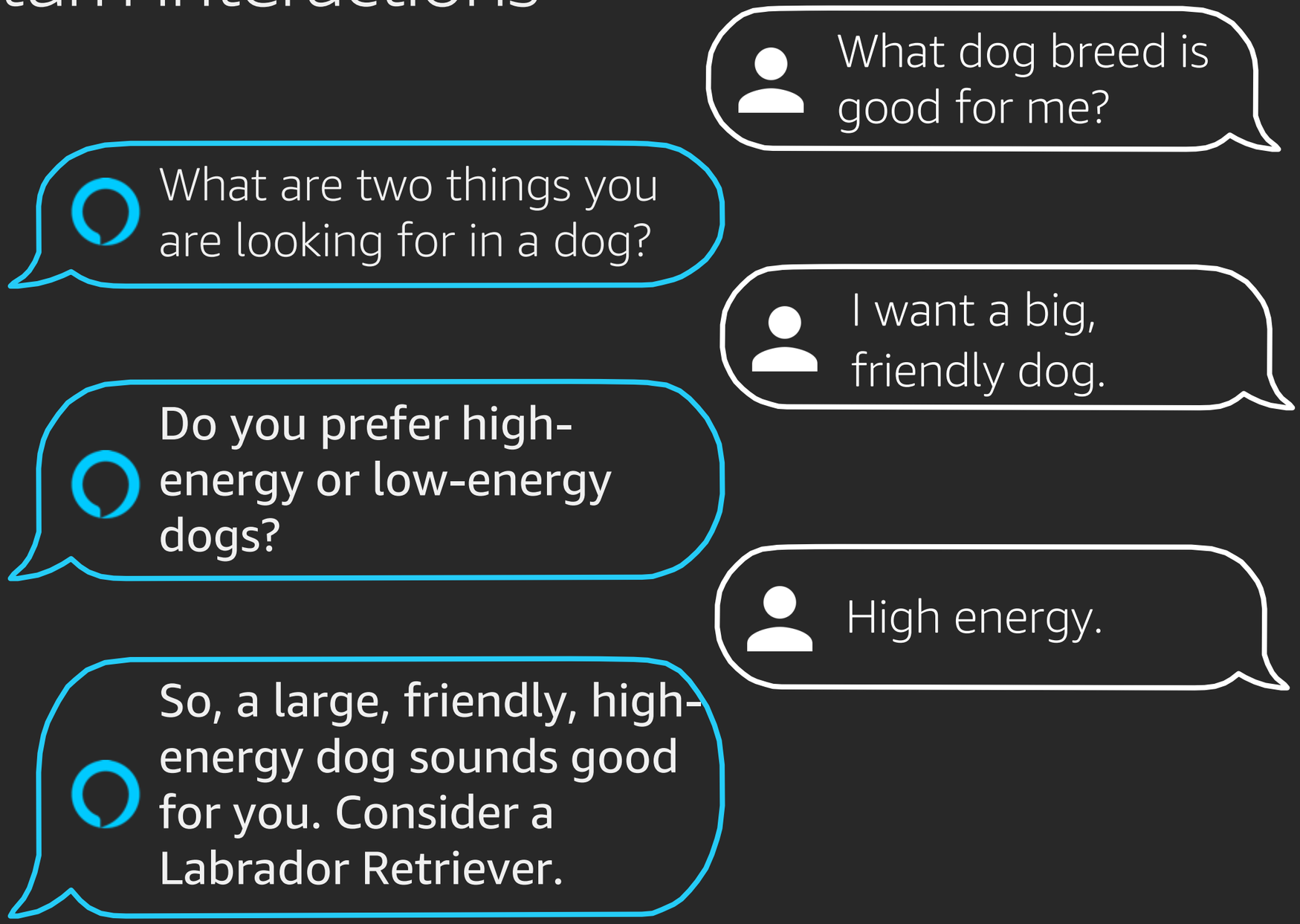
100,000+ Alexa skills



One-shot interactions



Multi-turn interactions



Dialog management (DM)

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Dialog management (DM)



Maintains conversational state

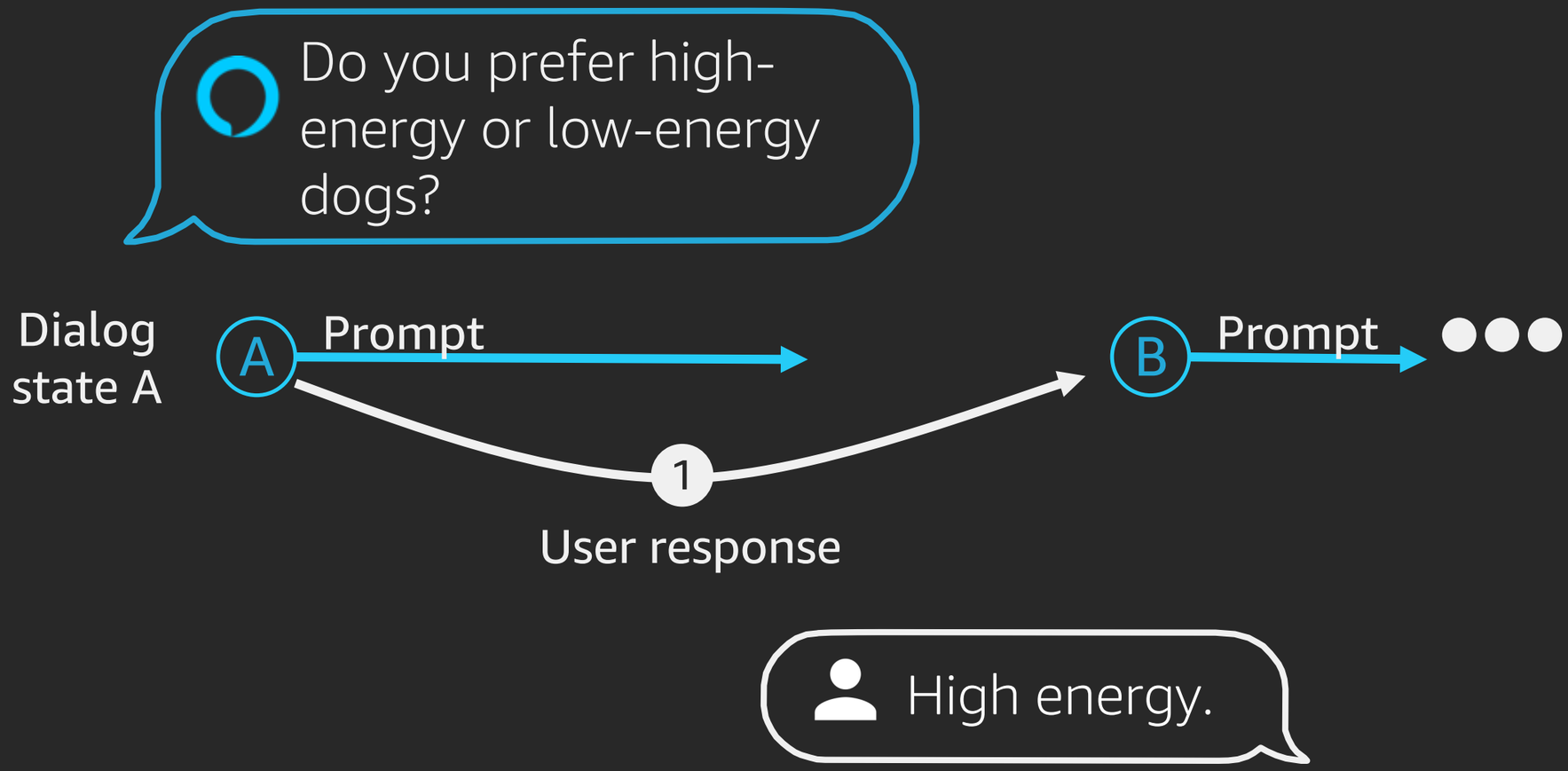


Prompts the user to attempt to get to a new next state

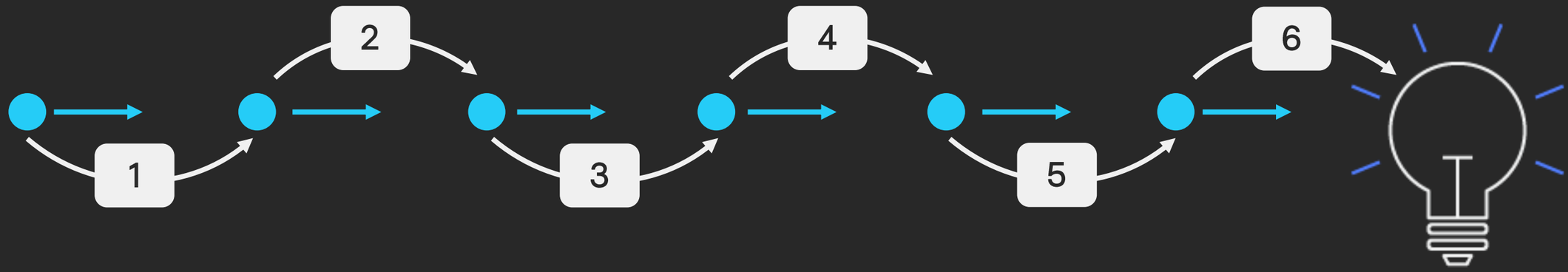


Interprets the user's response contextually

A single dialog turn

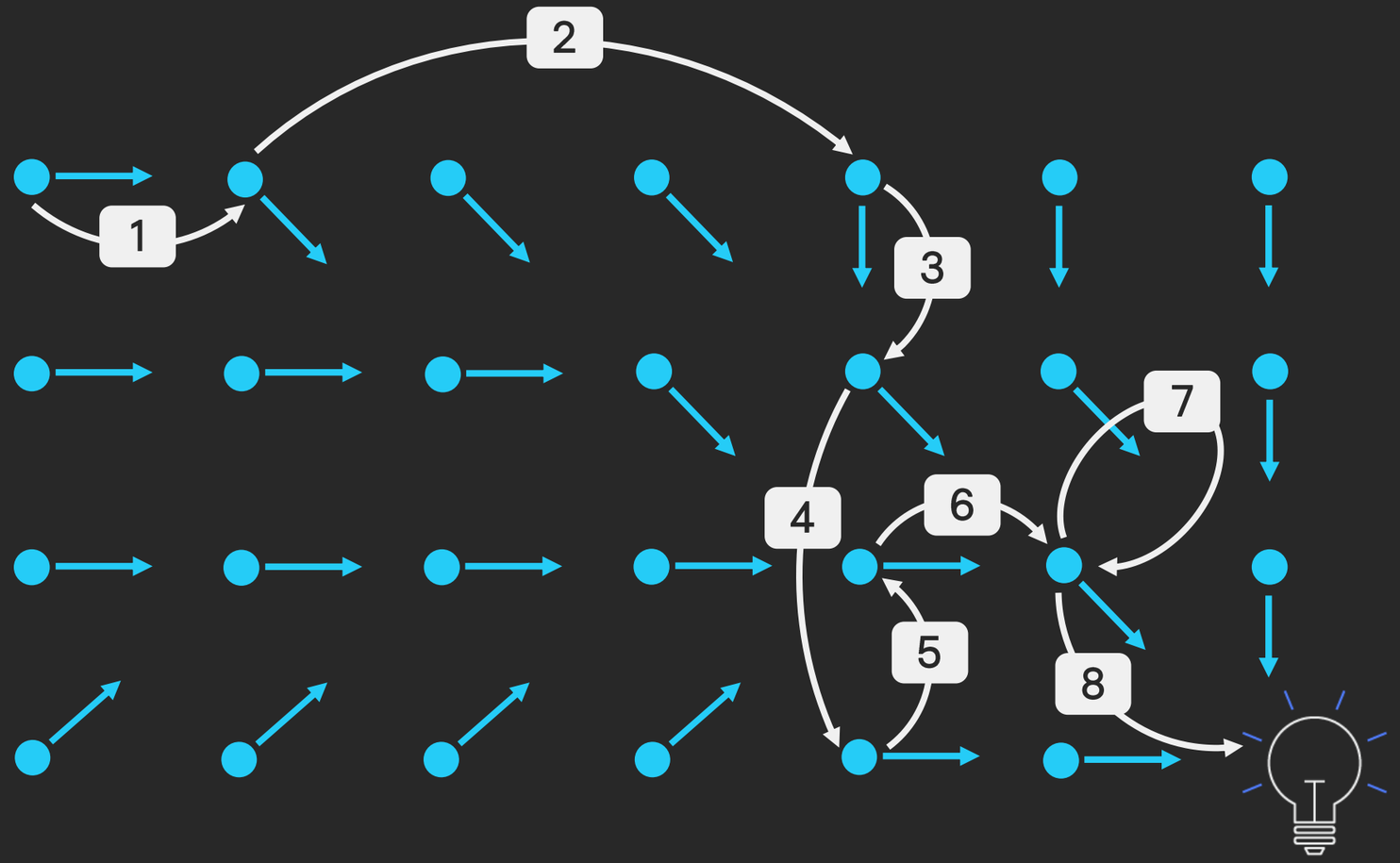


Linear multi-turn

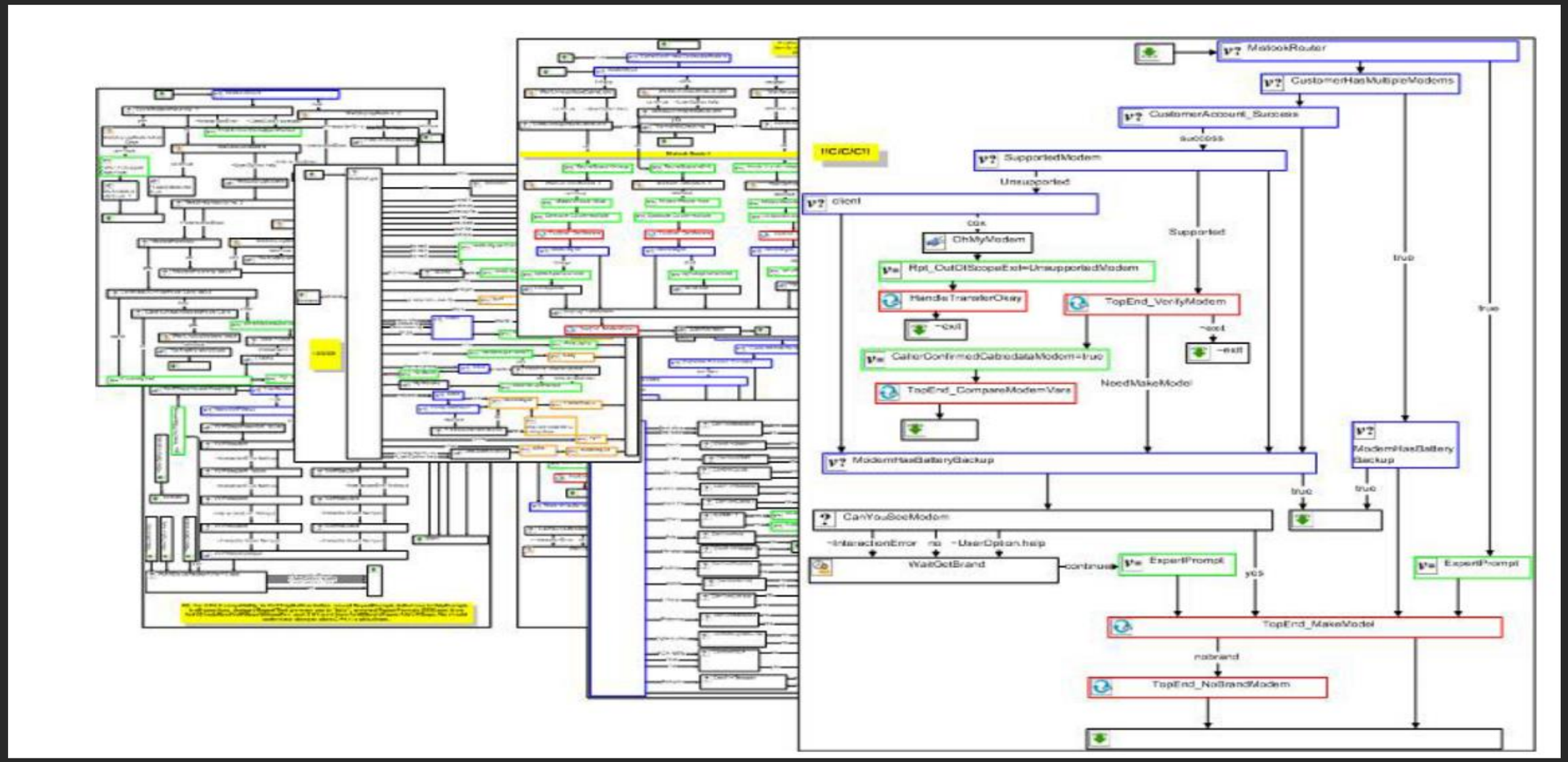


Nonlinear multi-turn

In reality, mixed initiative and edge cases add complexity



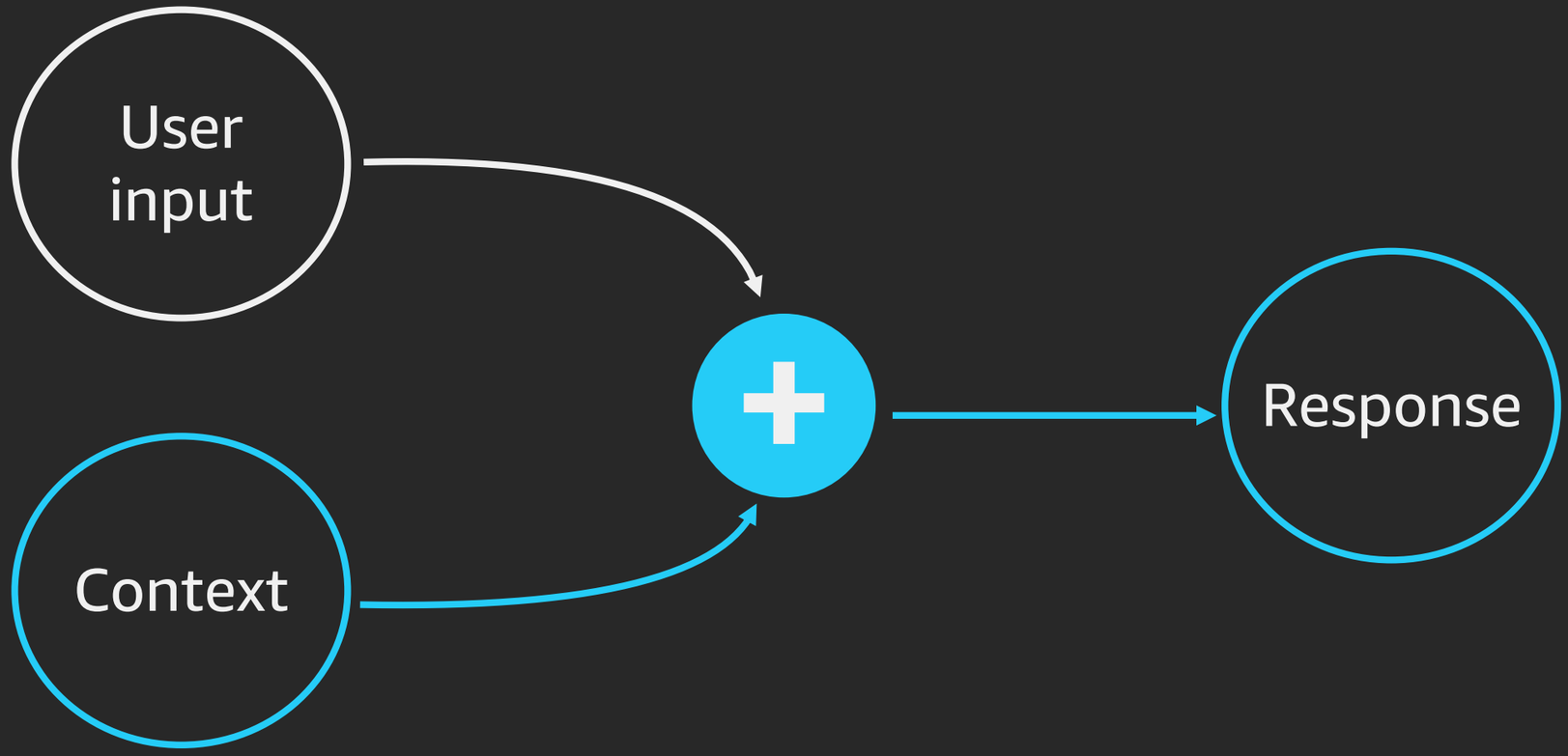
Old approach to nonlinear multi-turn



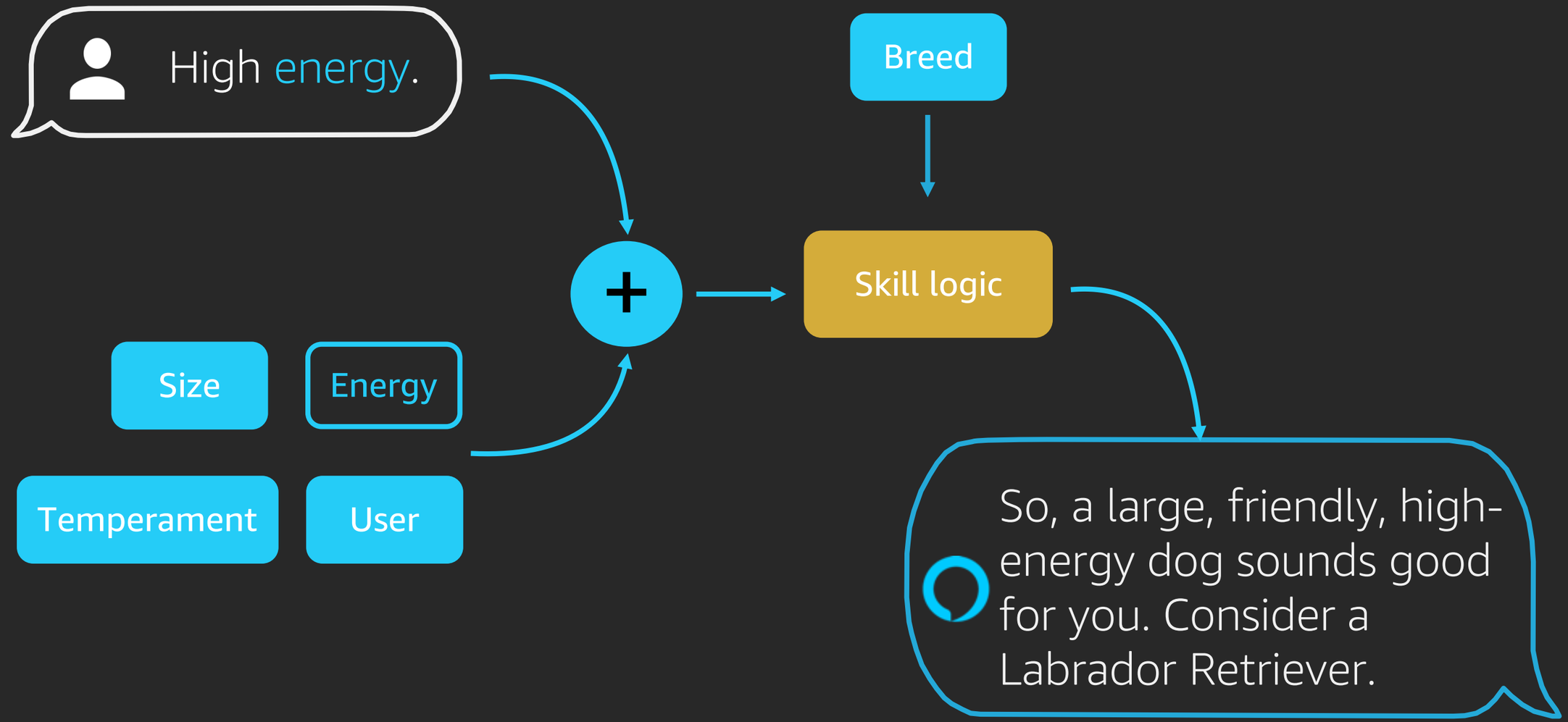
Screenshots from T. Paek and R. Pieraccini, Automating spoken dialogue management design using machine learning: An industry perspective, Speech Communication Journal, March 2008

Situational design

Situational design principles provide scalability to designing multi-turn CX



Context-driven responses



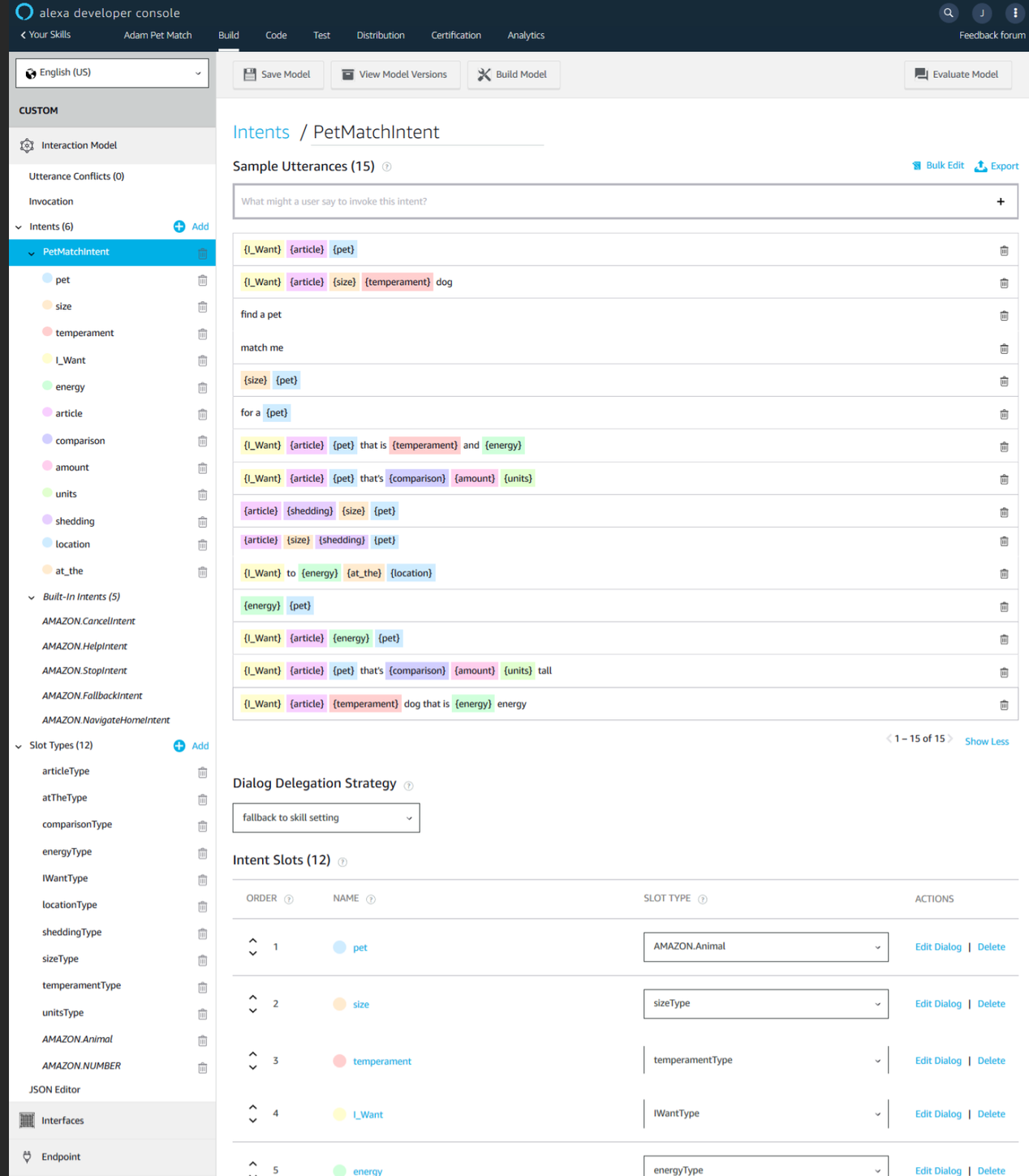
Intro to Pet Match

- An example skill created for re:Invent 2017 to highlight multi-turn design and implementation
- Leads the user through a multi-turn conversation to collect desirable attributes for a dog breed, then makes a recommendation
- Currently available as a sample skill in GitHub

http://alexa.design/petmatch

Building Pet Match

- 6 intents
- 11 custom and 1 built-in slot type
- 37 custom values + 66 synonyms
- 15 intent samples
- 17 slot samples
- 402 lines of custom AWS Lambda code



Challenges with Pet Match

- Brittle CX
- Complex interaction model
- Complex backend with dialog directives and state management

Building Pet Match with AI-driven DM

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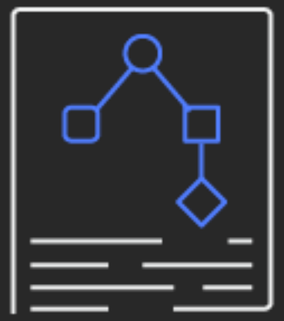
Alexa Conversations

Alexa conversations is a new deep learning-based approach that developers can use for creating natural voice experiences on Alexa

Alexa Conversations



More natural humanlike conversations

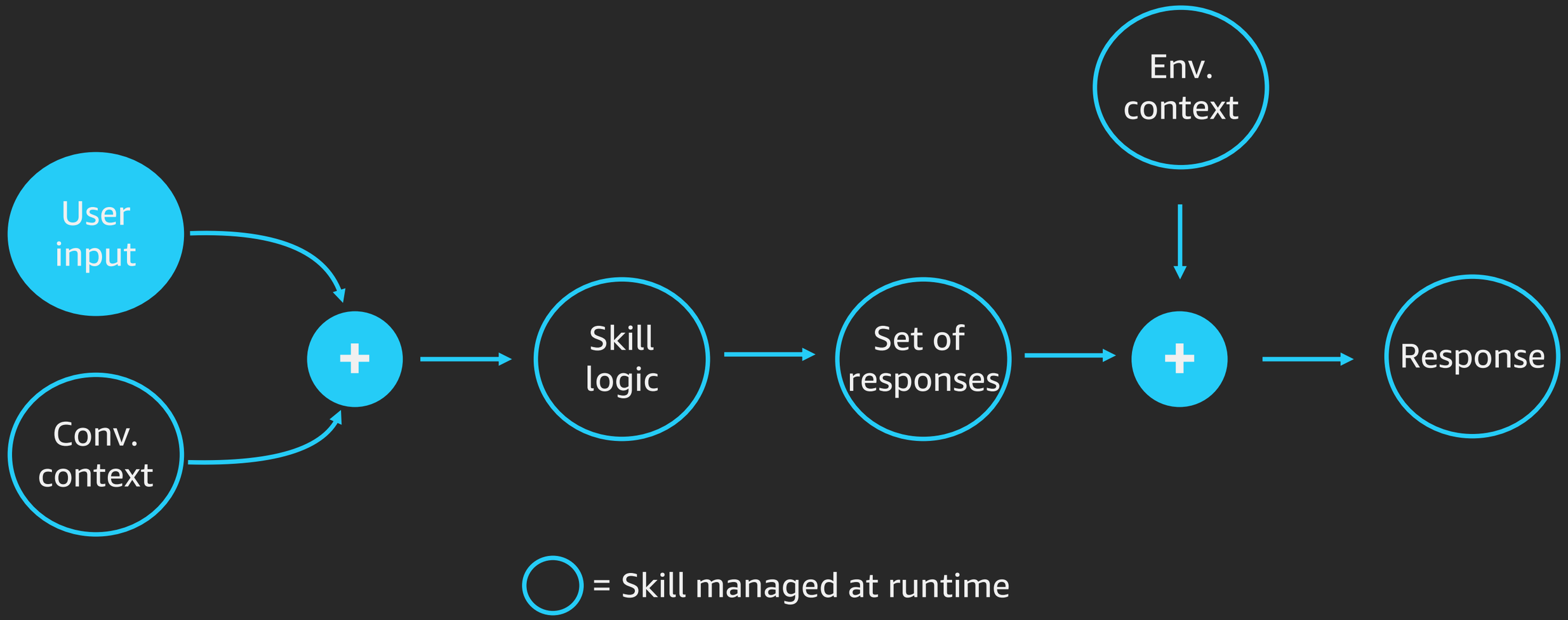


Less backend code for dialog state management

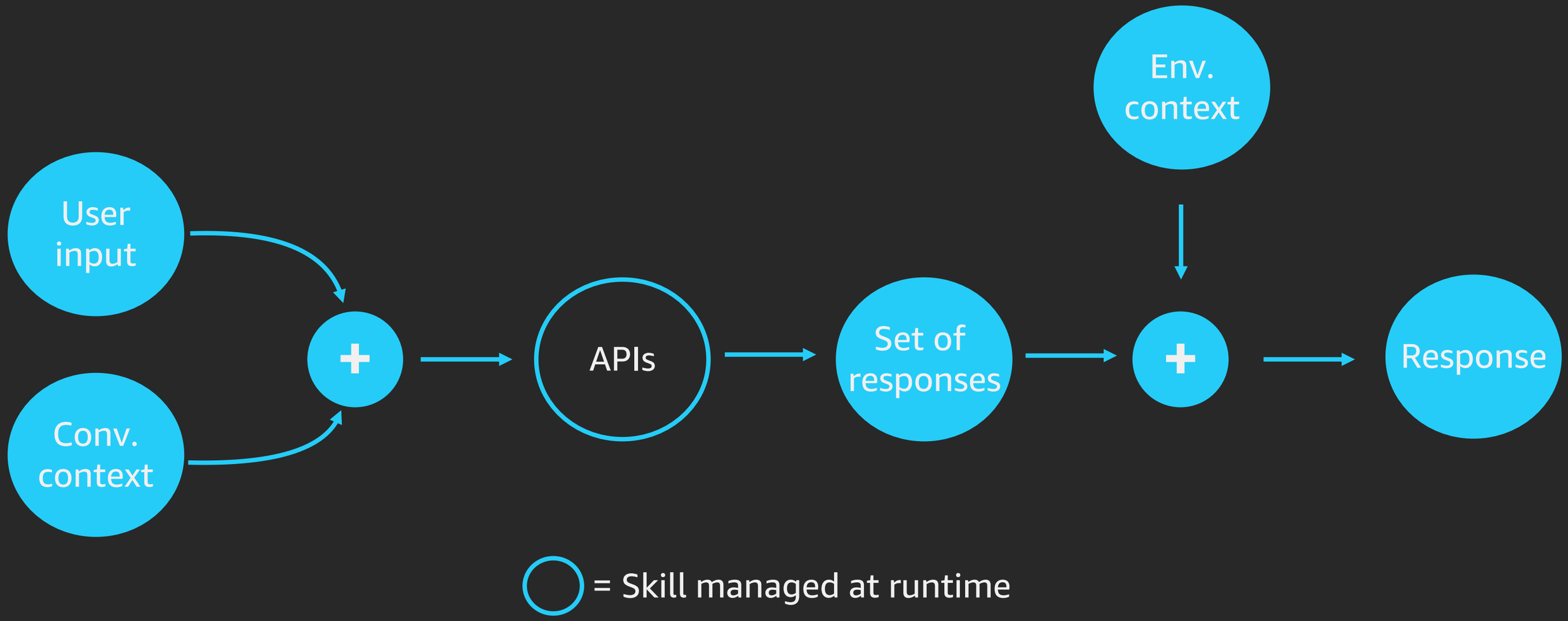


Less model training data

Custom DM runtime



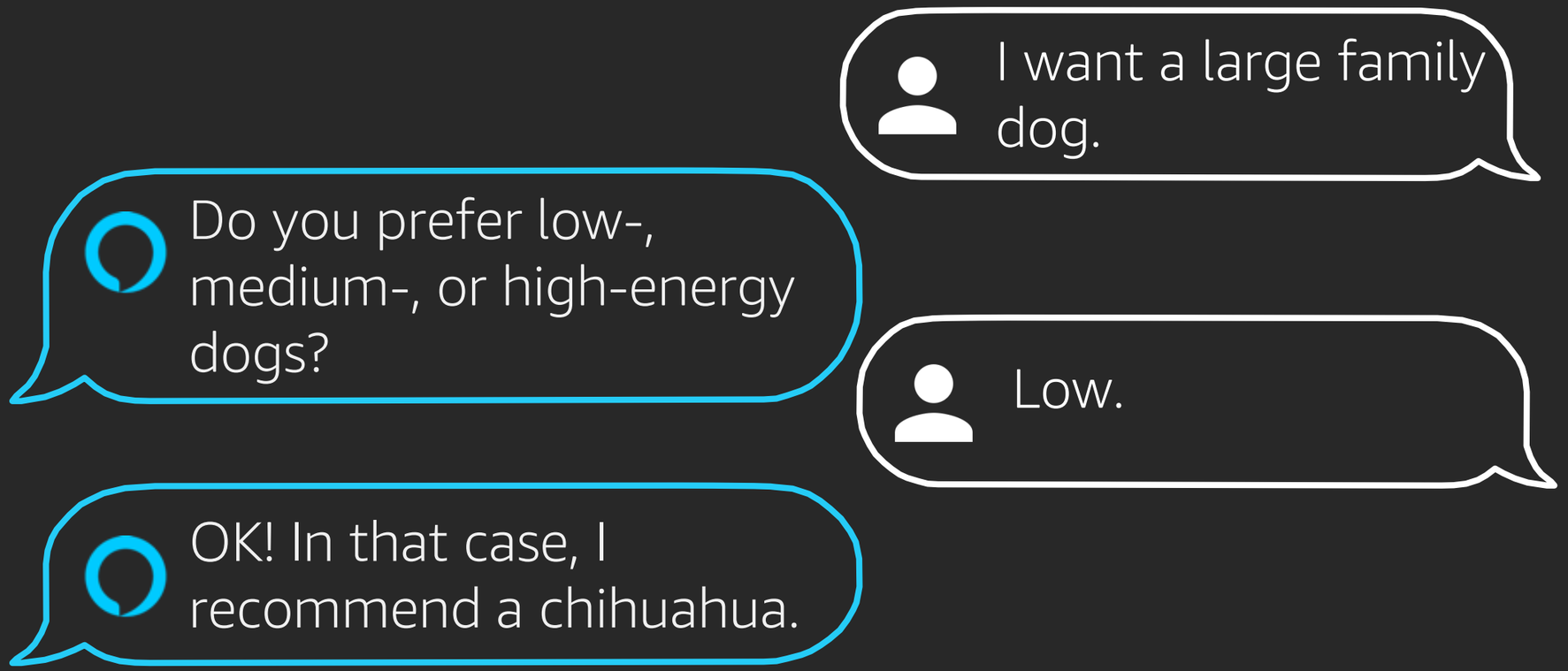
AI-driven DM runtime



AI-driven dialog build time



Building Pet Match: Start from the conversation



Surface form dialog

```
{start}
U: I want a large family dog
A: Do you prefer low, medium, or high energy dogs?
U: low
A: OK! In that case I recommend a chihuahua.
{end}
```

Annotated dialog

```
{start}

U: I want a [large|range -> range0] [family|temperament ->
temperament0] dog

A: { nlg: request_energy_energy() }

A: Do you prefer low, medium, or high energy dogs?

U: [low|energy -> energy0]

A: { call: GetRecommendation( temperament=$temperament0,
energy=$energy0, range=$range0) -> recommendationResult0 }

A: { nlg: notify_api_response_ GetRecommendation(
recommendationResult=$recommendationResult0) }

A: OK! In that case I recommend a chihuahua.

{end}
```

Let’s define our sample dialogs



Now we need to identify the entities



Define an API to do some work



Alexa Conversations API request


```
{
    "type": "API.Invoked",
    "requestId": "amzn1.echo-api.request.0001",
    "timestamp": "2019-12-1T17:58:28Z",
    "locale": "en_US",
    "_apiRequest": {
        "name": "GetRecommendation",
        "requestEntity": {
            "temperament": "friendly",
            "range": "large",
            "energy": "low"
```

Skill endpoint: APIRecommendDog - canHandle

```
const APIRecommendDog = {
    canHandle(handlerInput) {
        return handlerInput.requestEnvelope.request.type === "API.Invoked"
        && handlerInput.requestEnvelope.request._apiRequest.name === "GetRecommendation";
    },
    async handle(handlerInput){
        ...
    }
};
```

API endpoint: APIRecommendDog - handle

```
async handle(handlerInput){
    const requestEntity = handlerInput.requestEnvelope.request._apiRequest.requestEntity;
    const response = await getRecommendation(requestEntity.energy, requestEntity.range,
        requestEntity.temperament);
    const recommendationEntity = {
        recommendation: response.result[0].breed;
    };
    return handlerInput.responseBuilder
        .setApiResponse('SUCCESS', recommendationEntity)
        .getResponse();
}
```

Define our response templates



Annotate dialogs and build the model



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