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COM201

How I fed my cat with the Alexa Gadgets Toolkit

Nathan Glover

Senior DevOps Consultant

Mechanical Rock

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Agenda

What is an Alexa Gadget?

Why use the Alexa Gadget Toolkit?

What can Alexa Gadgets do?

Using the Alexa Gadget Toolkit

Building an Alexa Gadget cat feeder



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What is an Alexa Gadget?

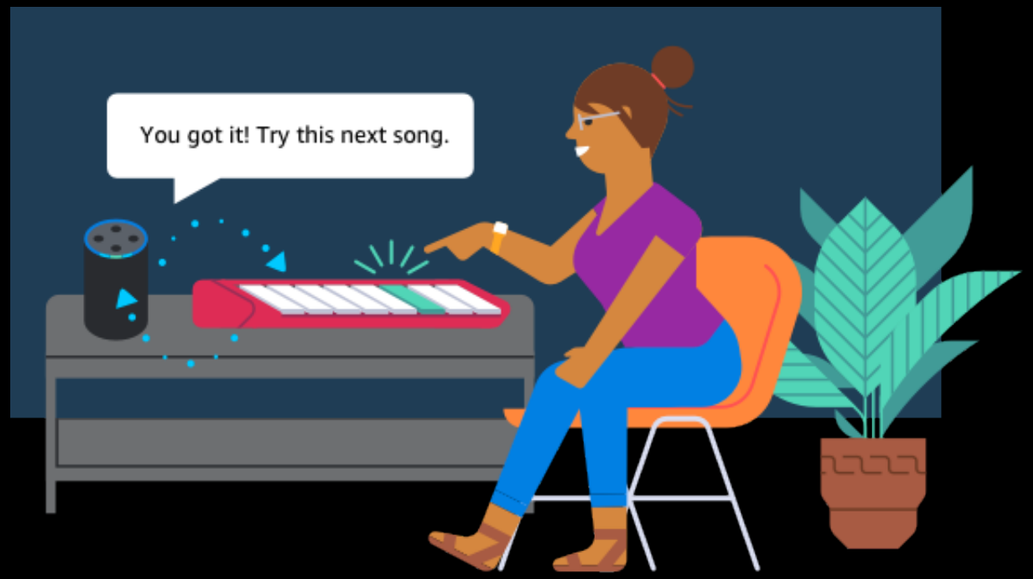


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Alexa Gadgets

- Anything – seriously!
- Companion device to Alexa
- Connects over Bluetooth





Why use the Alexa Gadgets Toolkit?



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State of IoT: 2020

- IoT device market anticipated to reach **$1.1 trillion** by 2026
- **152,200** IoT devices per minute by 2025
- Over **100 million** Alexa-enabled devices *(start of 2019)*
- **90,000** skills available for Alexa-enabled devices as of April 2019



Sources: Vega, Malvina. “Internet of Things Statistics, Facts & Predictions [2020’s Update].” https://review42.com/internet-of-things-stats/
Crane, Casey, “20 Surprising IoT Statistics You Don’t Already Know.” https://securityboulevard.com/2019/09/20-surprising-iot-statistics-you-dont-already-know

“Fewer than 20% of risk professionals can identify a majority of their organization’s IoT devices”

“76% of risk professionals think IoT leaves them at risk of cyber attacks”

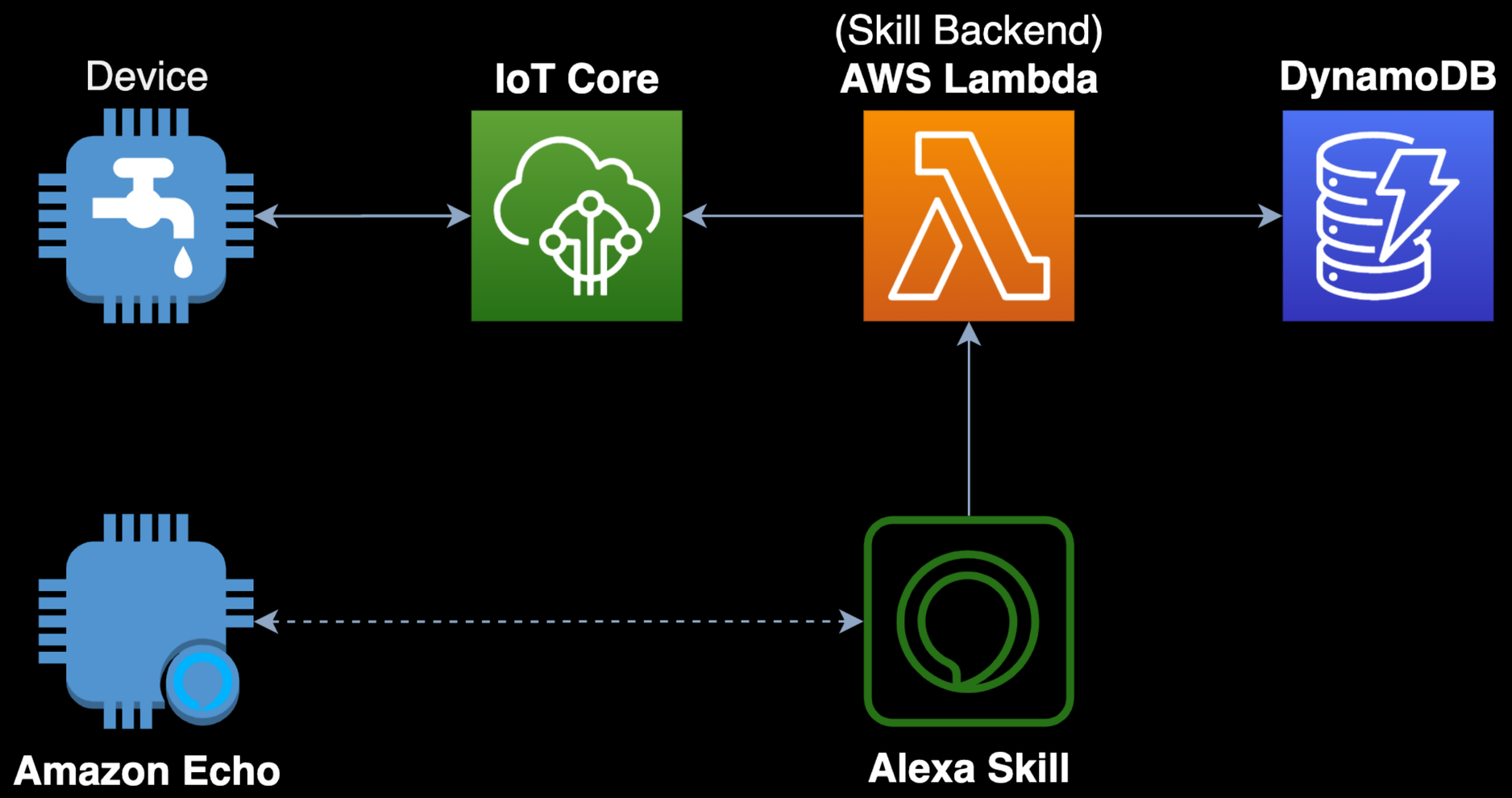
Robin Slade

Ponemon Institute and
Shared Assessments study

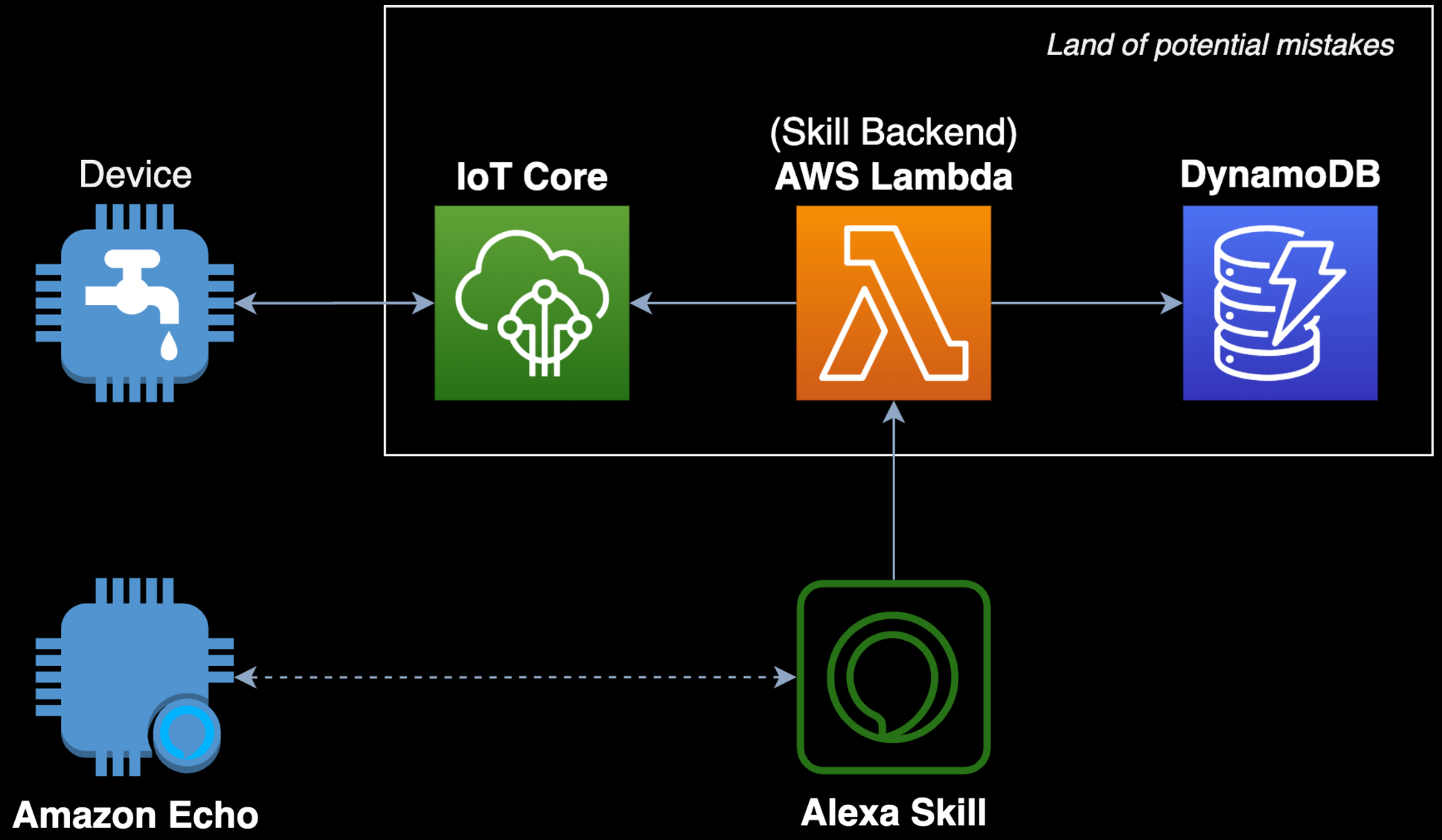


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Typical smart home device

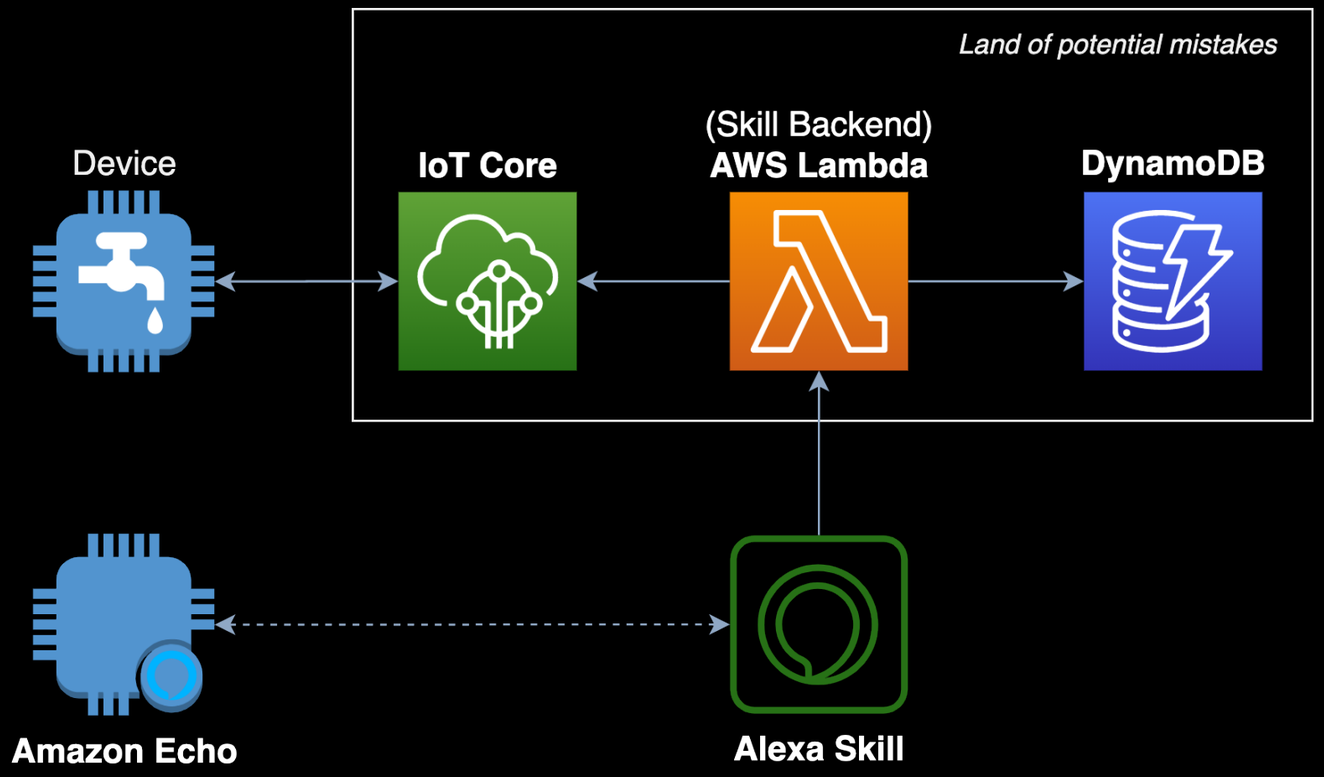


Typical smart home device

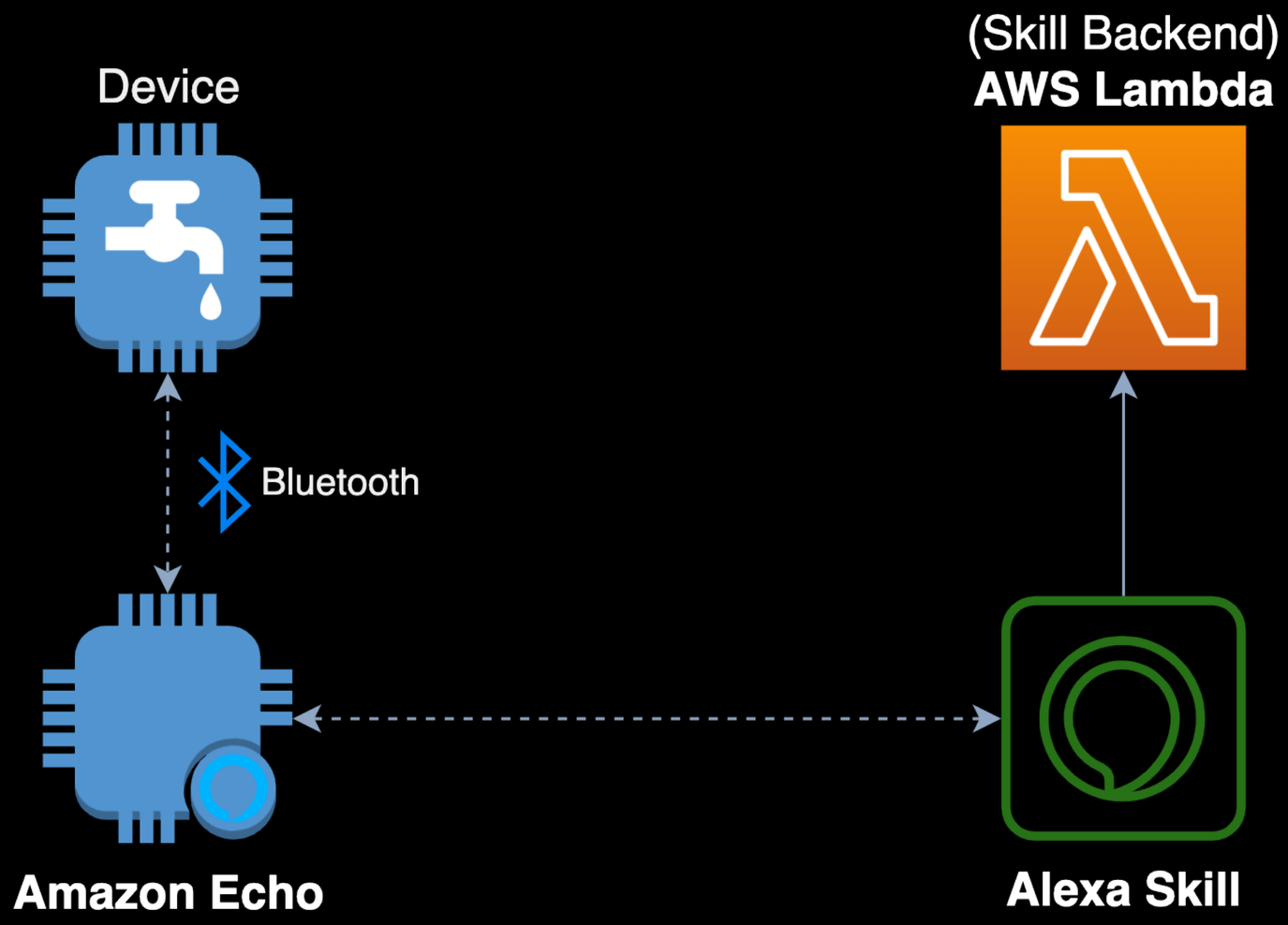


Typical smart home device (mistakes)

- Opportunity to make mistakes
- Appliance companies ≠ tech companies (most of the time)
- **Your** responsibility to keep customers safe

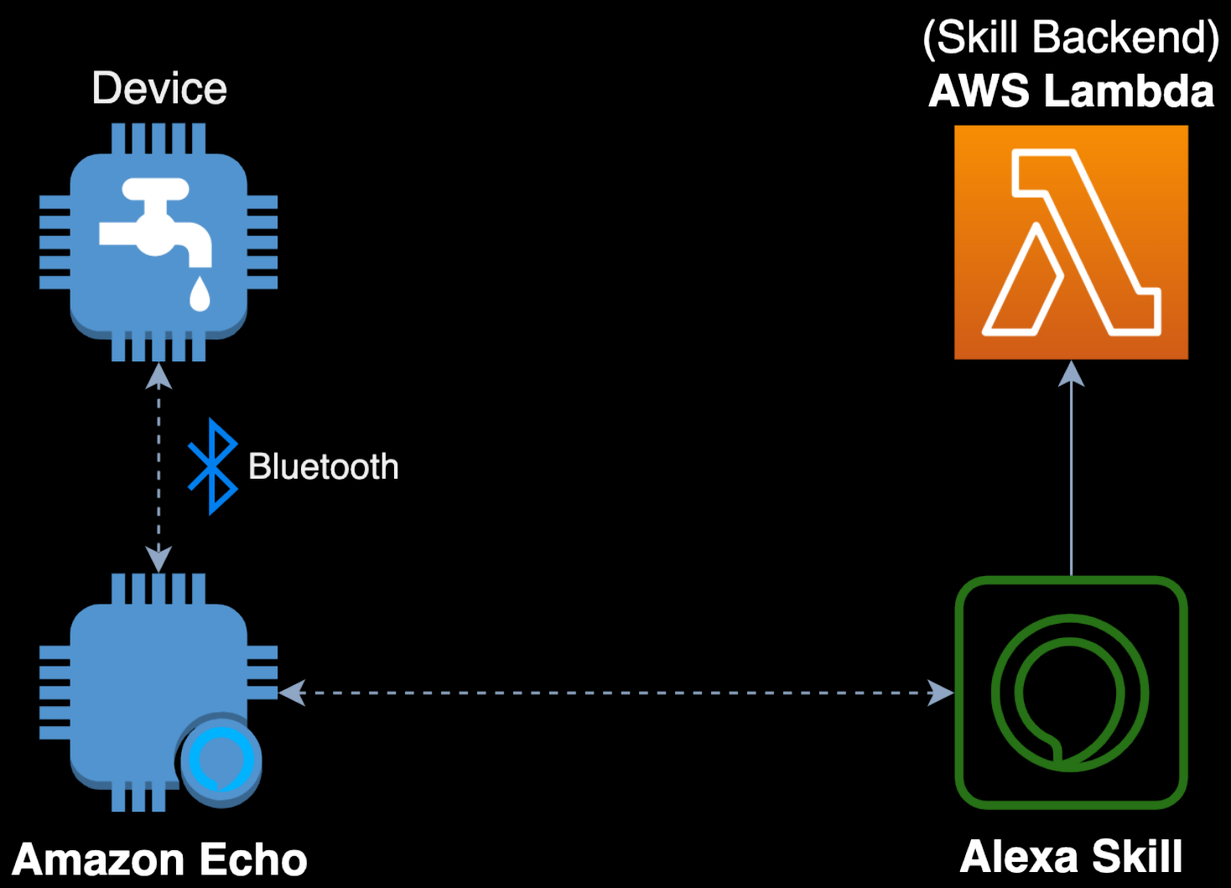


Improved smart home device



Improved smart home device (solution)

- Remove the backend
  - Hobbyists and product manufacturers can focus on what they are great at – building their devices
- Communicate through Alexa devices
- Same functionality, less footprint
- Arguably more secure



What can Alexa Gadgets do?



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Timers and alarms

- Syncs time
- LED lights for timers



Tempo

- Dancing bears
- Shakes based on the tempo of the music playing on Alexa



Speech

Speechmark data for lip-syncing devices



Using the Alexa Gadgets Toolkit



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What will you need?

- Raspberry Pi with Bluetooth 4.2+ and an internet connection
  - In theory any device could work
  - Official support is only documented for Raspberry Pi's and Embedded C devices
- Amazon Developer account
- An Echo device that is compatible with Alexa Gadgets

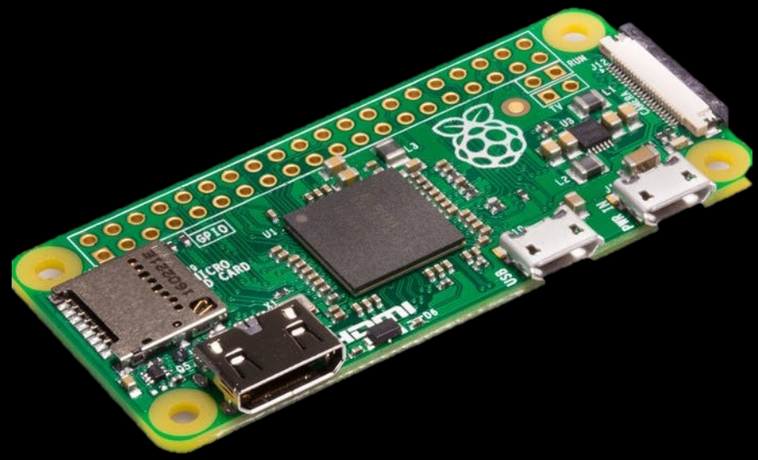
Supported devices

Echo device	Bluetooth support
Echo (1st, 2nd, 3rd, and 4th generation)	1st generation – Classic BT only 2nd-4th generation – Classic BT and BLE
Echo Dot (1st, 2nd, 3rd, and 4th generation)	1st generation – Classic BT only 2nd–4th generation – Classic BT and BLE
Echo Dot Kids Edition (2nd, 3rd, and 4th generation) Echo Dot with Clock (3rd and 4th generation)	Classic BT and BLE
Echo Spot	Classic BT and BLE
Echo Flex	Classic BT and BLE
Echo Input	Classic BT and BLE
Echo Plus (1st and 2nd generation) Echo Show (1st and 2nd generation) Echo Show (5, 8, and 10)	Classic BT and BLE
Echo Studio	Classic BT and BLE

My devices



Echo Spot

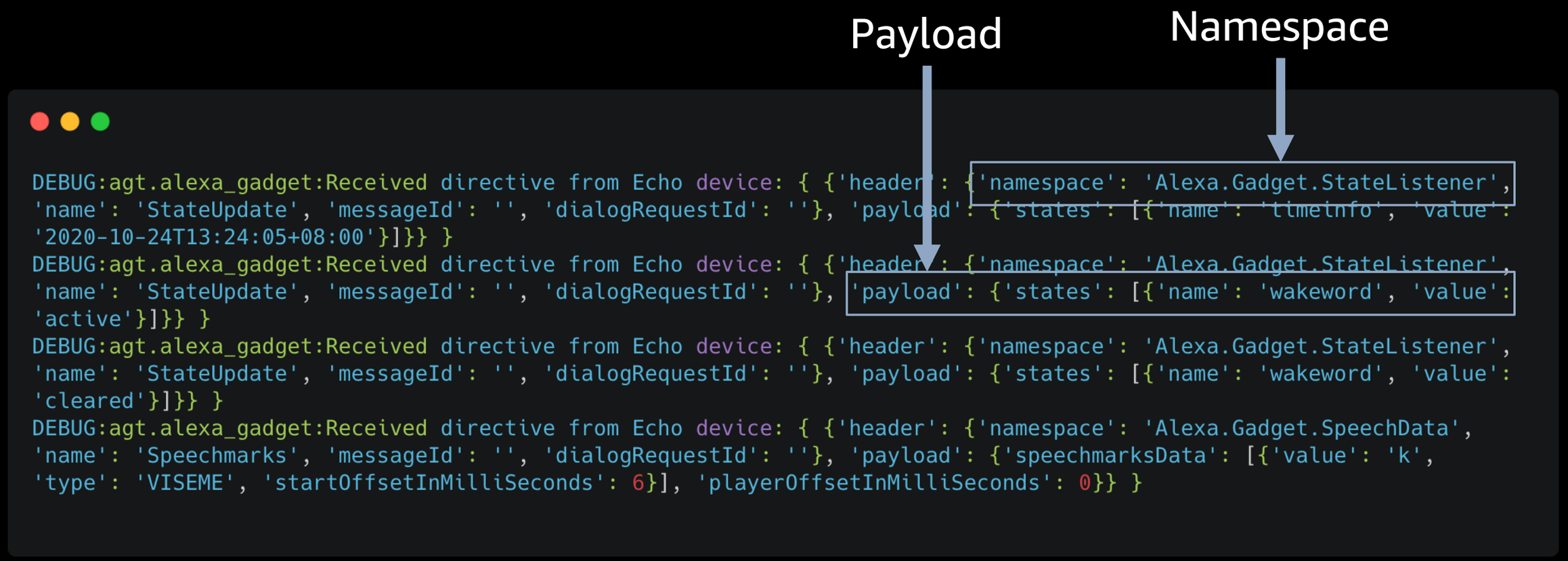


Raspberry Pi Zero W

Amazon Alexa Gadget directives

Interface	Purpose	Directive(s)
Alerts	Provides directives that instruct your gadget to set a timer, alarm, or reminder for a specific time or duration or to delete a timer that is set	**SetAlert** **DeleteAlert**
Alexa.Discovery	Queries the gadget for its details and capabilities	**Discover**
Alexa.Gadget.MusicData	Sends your gadget tempo data for Amazon Music that the Echo device is playing	**Tempo**
Alexa.Gadget.SpeechData	Provides your gadget speechmark data that enables the gadget to synchronize speech with visual experiences	**Speechmarks**
Alexa.Gadget.StateListener	Informs your gadget when an alarm, timer, or reminder is started or stopped and when the wake word is detected; also provides your gadget with time information from the Echo device	**StateUpdate**
Notifications	Enables the gadget to inform users that new content is available from Alexa domains or an enabled Alexa skill	**SetIndicator** **ClearIndicator**

Sample directives



Amazon Alexa Gadget custom interfaces

- Want more than the normal capabilities?
- Custom Gadget interfaces to the rescue!

```
[GadgetCapabilities]
Alexa.Gadget.StateListener = 1.0 - timeinfo
Alerts = 1.1
Notifications = 1.0
Alexa.Gadget.MusicData = 1.0 - tempo
Alexa.Gadget.SpeechData = 1.0 - viseme
```

Namespace rules:

```
[Cc]ustom.[a-zA-Z][a-zA-Z.]{0,120}
```

```
Custom.MyCoolInterface.Yay
```



```
[GadgetCapabilities]
Custom.ColorCyclerGadget = 1.0
```

Project: Building an Alexa Gadget cat feeder



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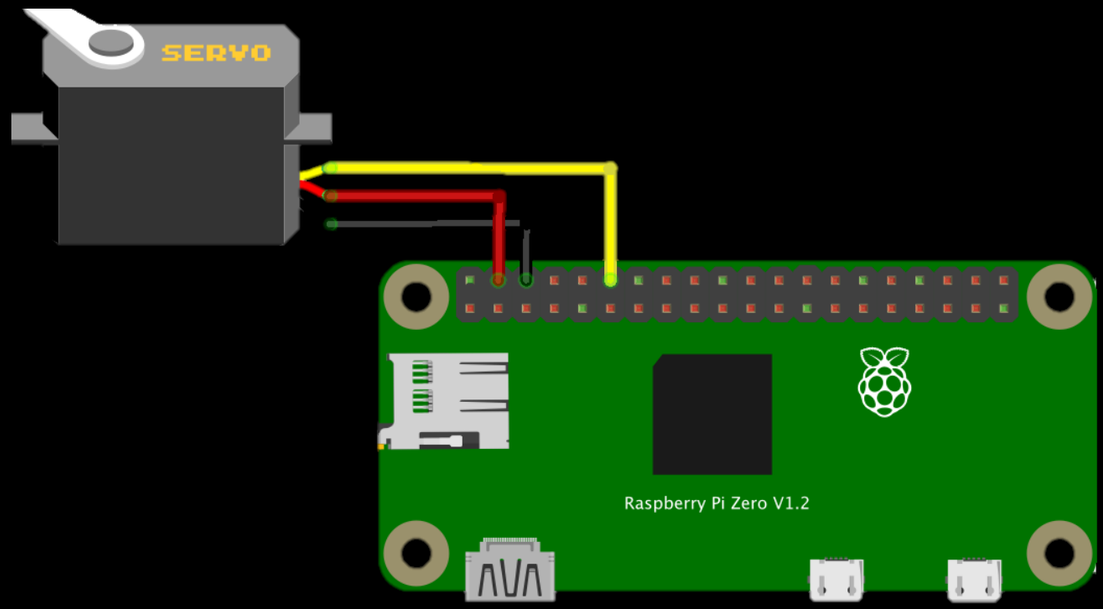
Overview of idea

- Want to feed my cat with the help of Alexa
- Cat feeder is always going to be around Echo, so it makes for a *purr*fect gadget idea



How it works

- Alexa skill handles voice control
  - Alexa code deployed using ask-cli
- Bluetooth from Echo to Raspberry Pi
  - Gadget code to open servo



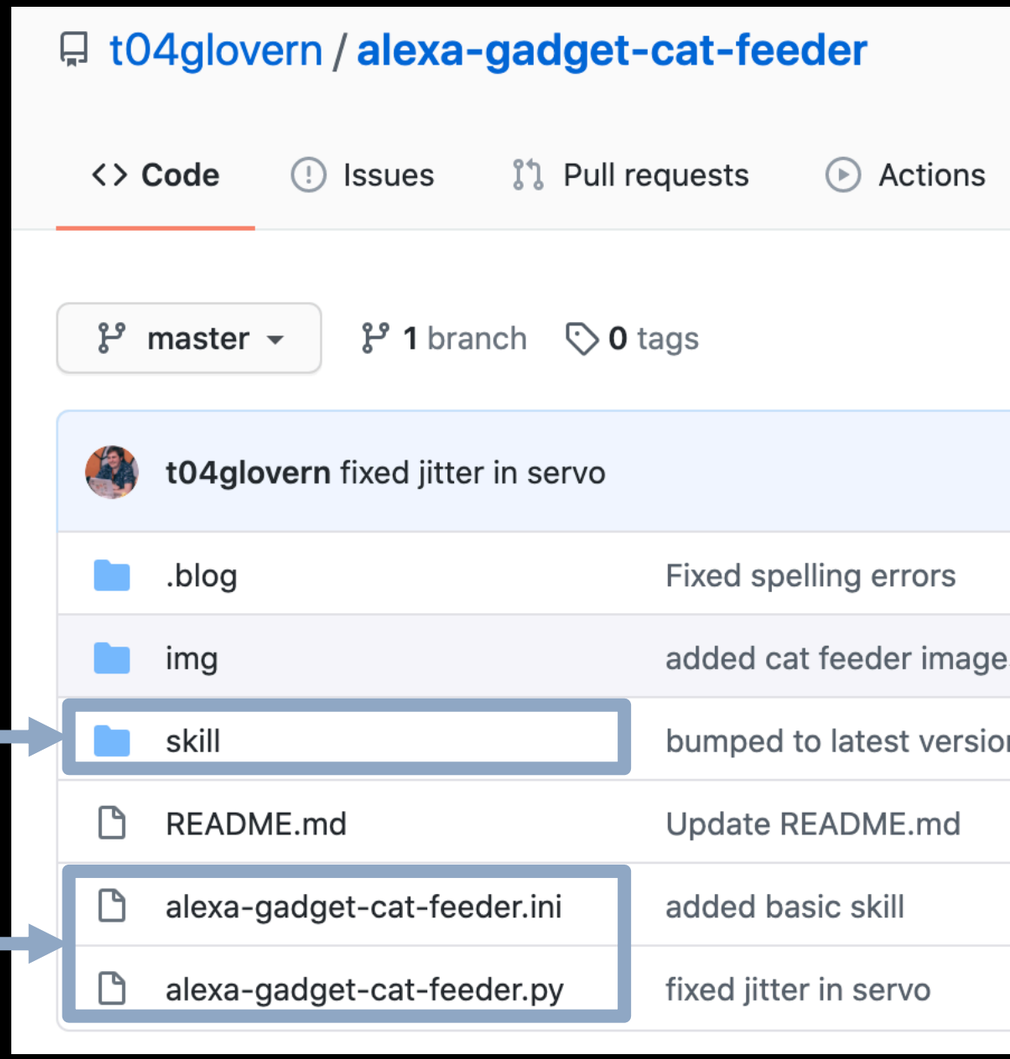


Code

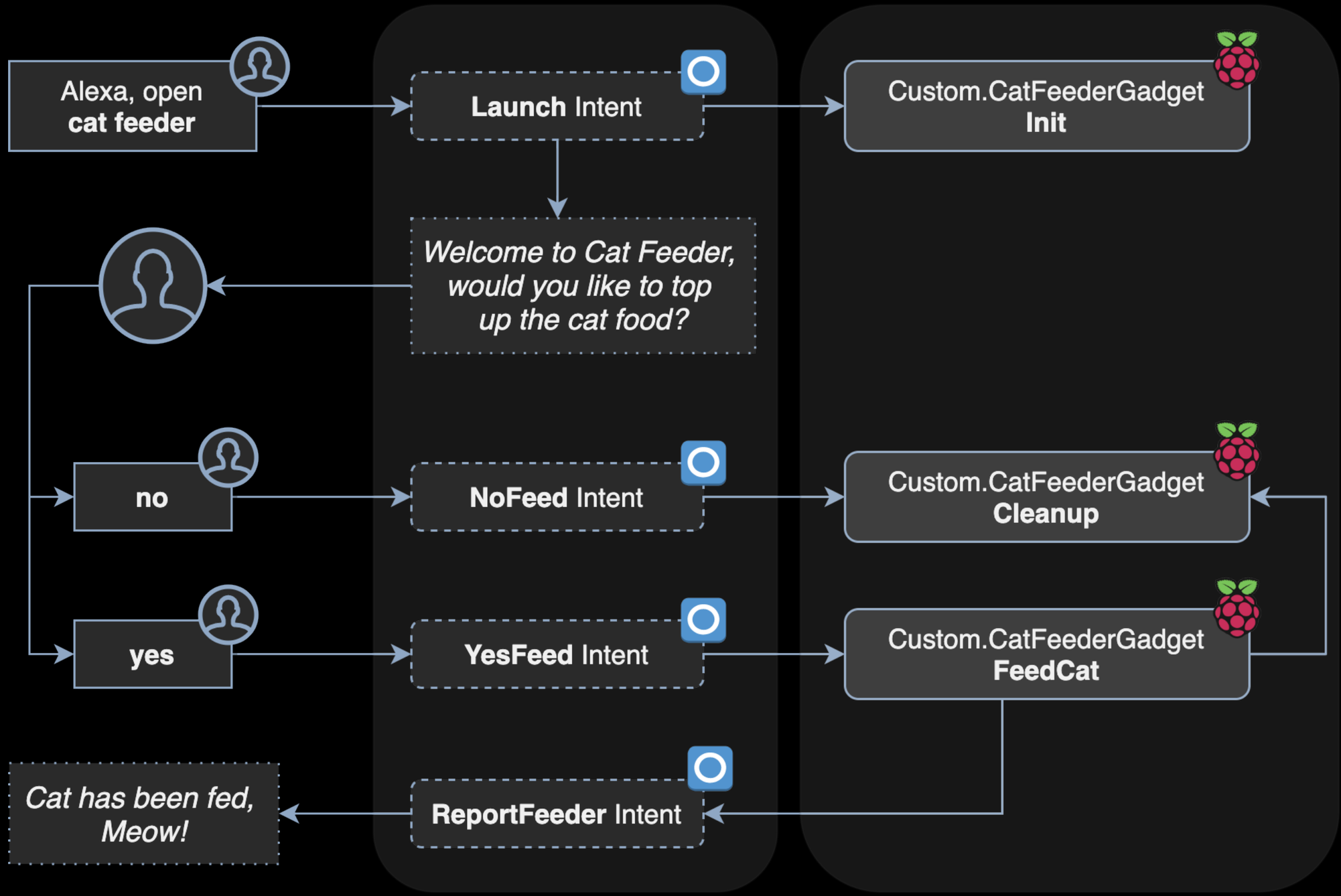
```
git clone https://github.com/t04glovern/alexa-gadget-cat-feeder.git
```

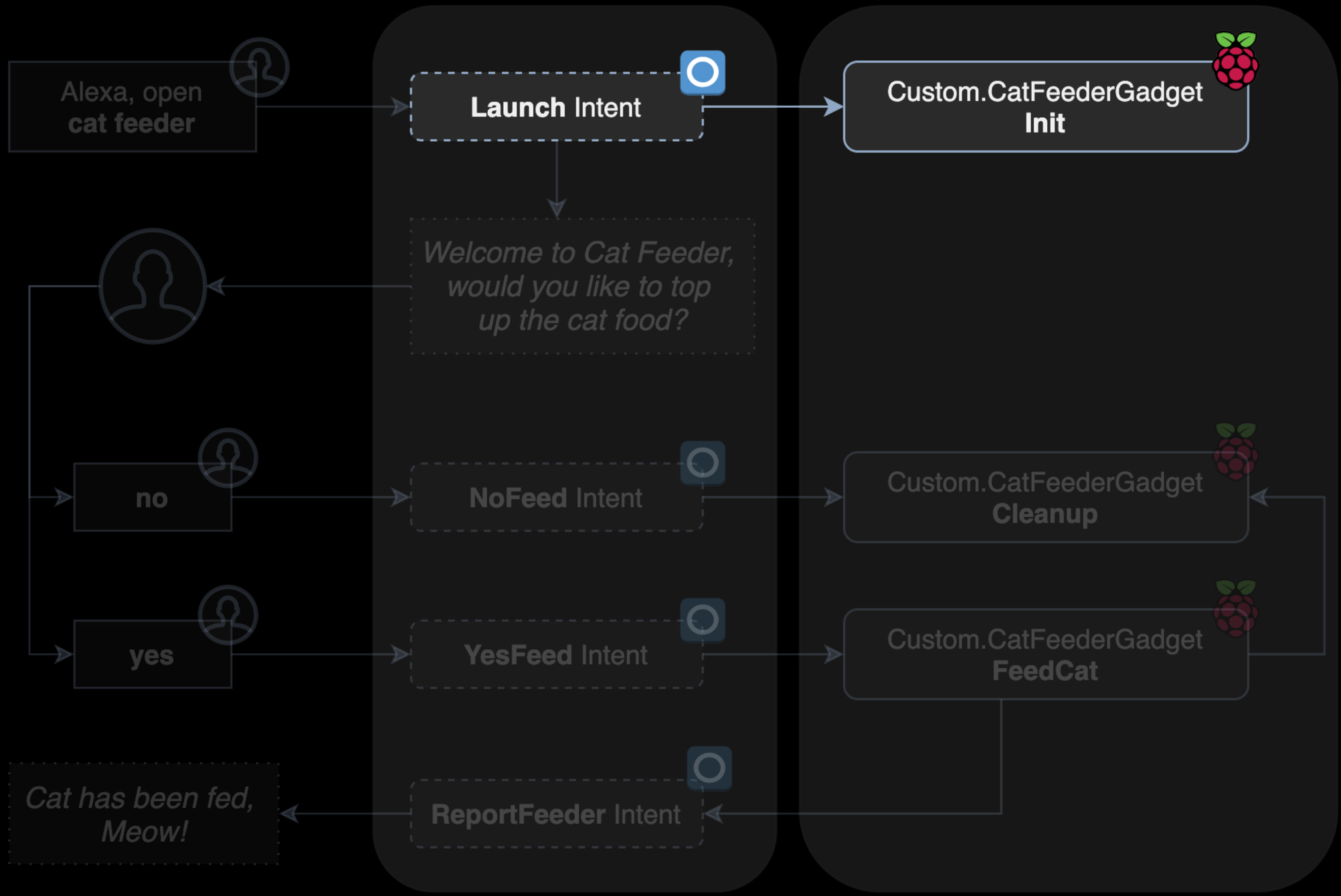
Deployed as an Alexa skill

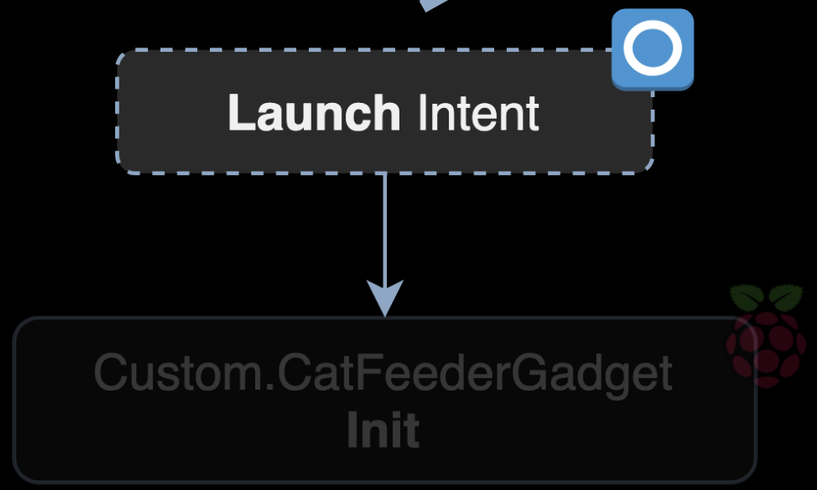
Deployed to the Raspberry Pi (Gadget)



github.com/t04glovern/alexa-gadget-cat-feeder


Alexa, open
cat feeder
Launch Intent
Custom.CatFeederGadget
Init
Welcome to Cat Feeder, would you like to top up the cat food?
no
NoFeed Intent
Custom.CatFeederGadget
Cleanup
yes
YesFeed Intent
Custom.CatFeederGadget
FeedCat
Cat has been fed, Meow!
ReportFeeder Intent

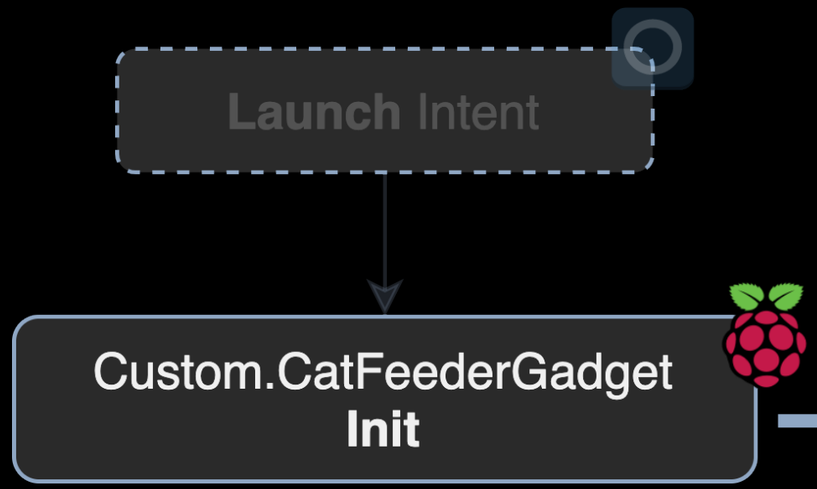

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Custom.CatFeederGadget
FeedCat
Cat has been fed, Meow!
ReportFeeder Intent




```
// handlers/base/Launch.js
return handlerInput.responseBuilder
    .speak(handlerInput.t('WELCOME_MSG'))
    .withShouldEndSession(false)
    // Send the init directive
    .addDirective(InitDirective.build(endpointId))
    .getResponse();

// directives/Init.js
module.exports = {
    build: function (endpointId) {
        return {
            type: 'CustomInterfaceController.SendDirective',
            header: {
                name: 'Init',
                namespace: 'Custom.CatFeederGadget'
            },
            endpoint: {
                endpointId: endpointId
            },
            payload: {}
        };
    }
}
```

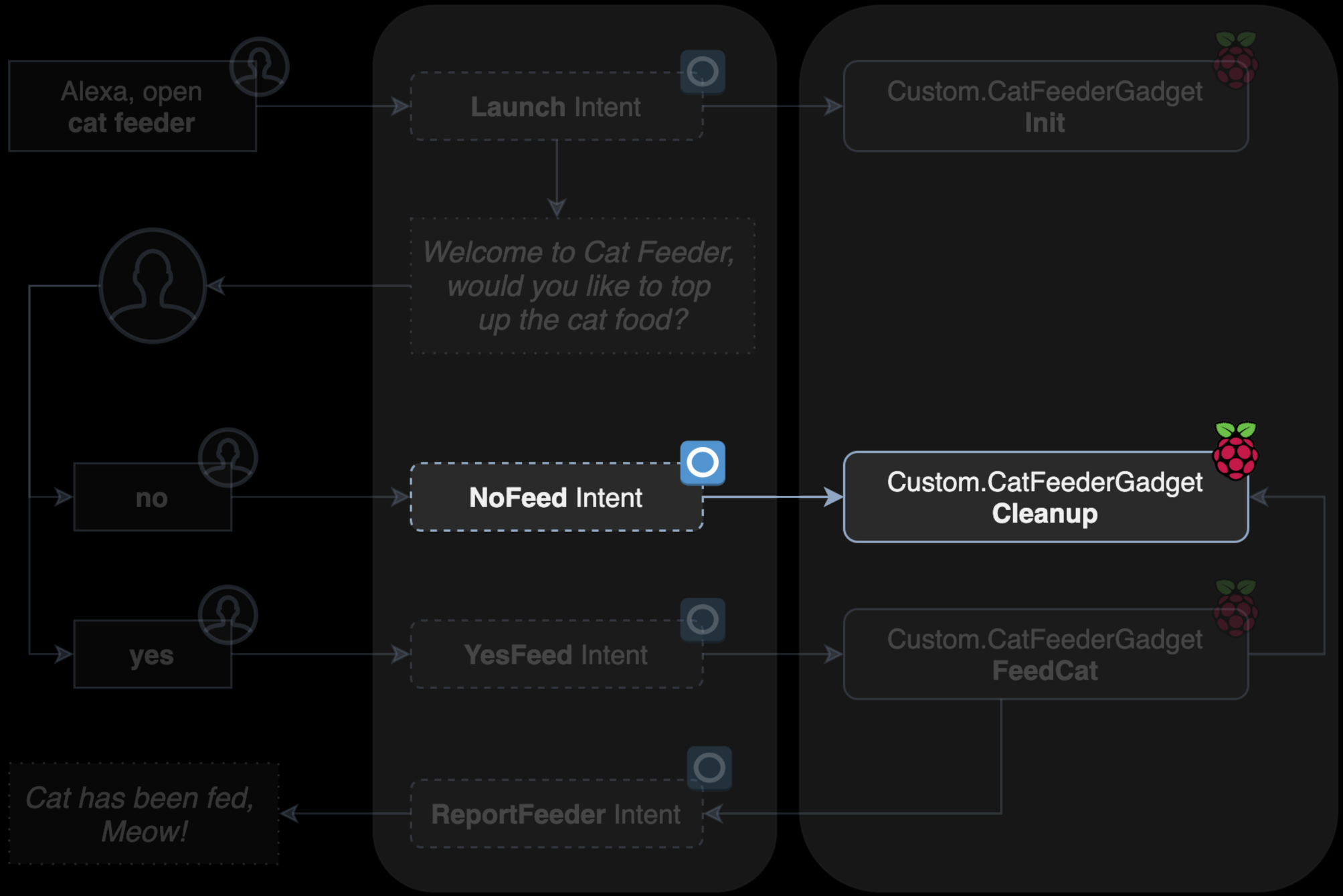
2

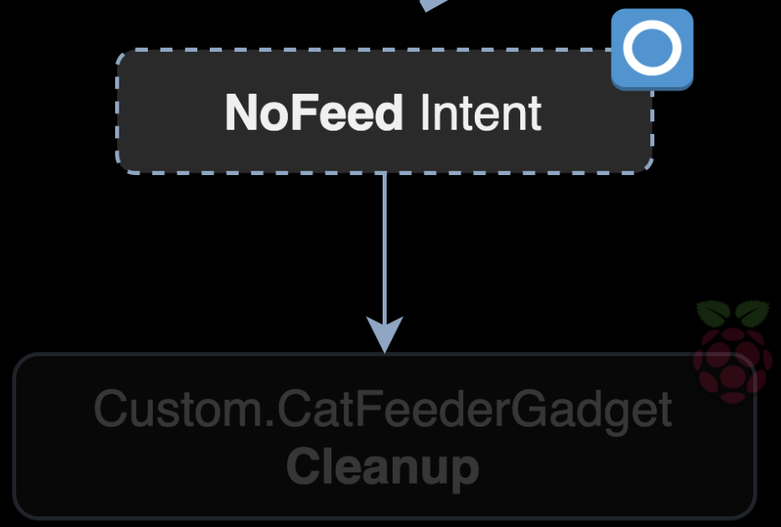



```python
class CatFeederGadget(AlexaGadget):
    """
    Class that logs each directive
    received from the Echo device.
    """

    def __init__(self):
        super().__init__()

    def on_custom_catfeedergadget_init(self, directive):
        """
        Handles Custom.CatFeederGadget.Init
        directive sent from skill
        """
        self._reset_feeder()
```

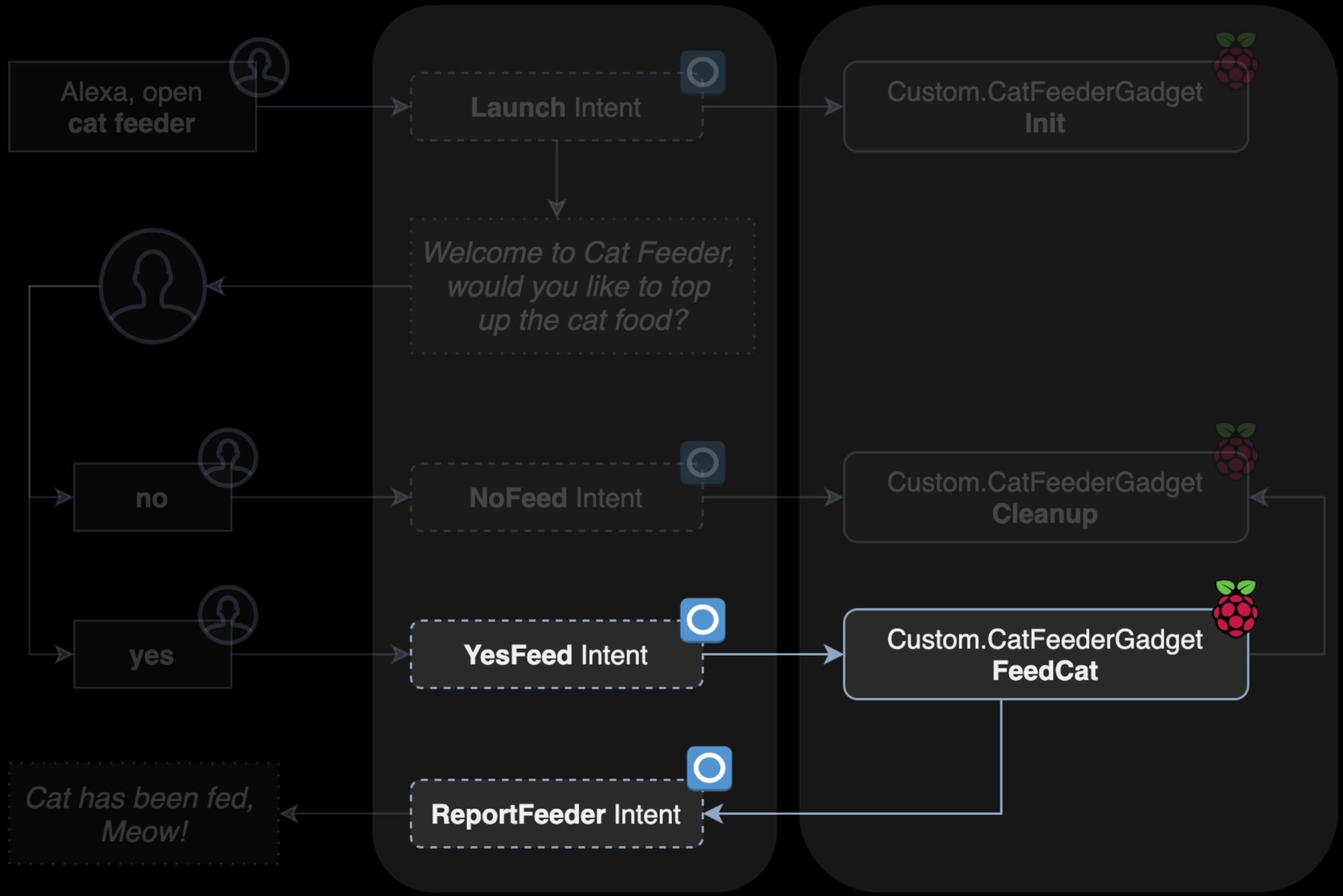

Alexa, open
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Custom.CatFeederGadget
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Custom.CatFeederGadget
Cleanup
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Cat has been fed, Meow!
ReportFeeder Intent

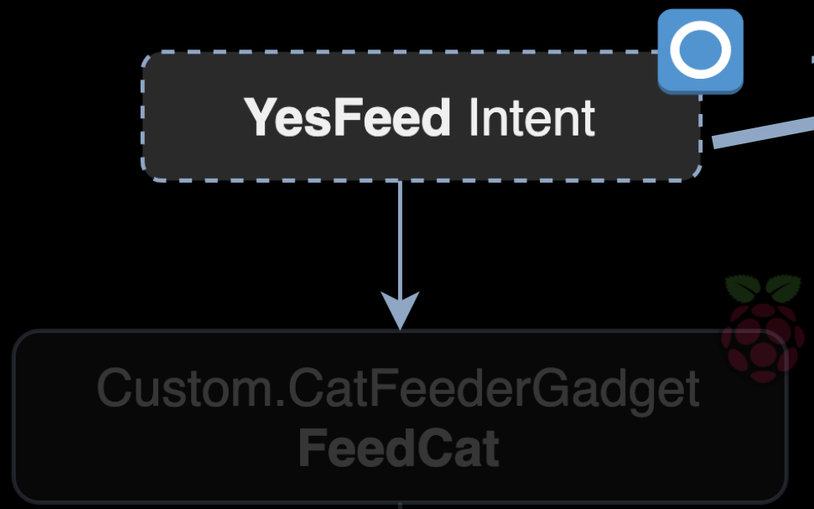



```
// handlers/NoFeed.js
return handlerInput.responseBuilder
    .addDirective(CleanupDirective.build(
        sessionAttributes.endpointId)
     )
    .speak("Alright. Good bye!")
    .withShouldEndSession(true)
    .getResponse();

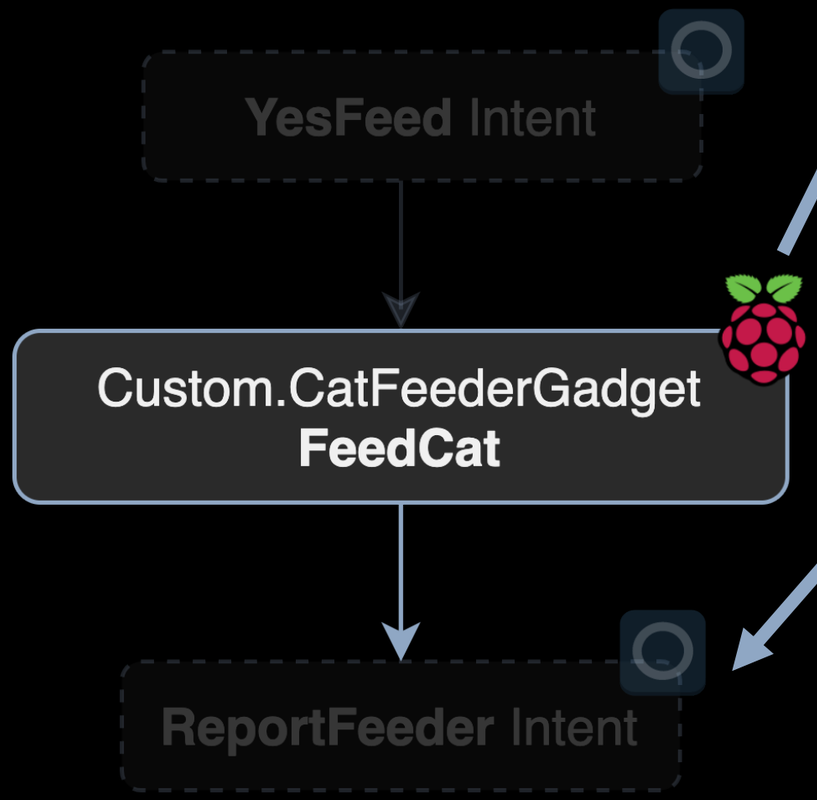
// directives/Cleanup.js
module.exports = {
    build: function (endpointId) {
        return {
            type: 'CustomInterfaceController.SendDirective',
            header: {
                name: 'Cleanup',
                namespace: 'Custom.CatFeederGadget'
            },
            endpoint: {
                endpointId: endpointId
            },
            payload: {}
        };
    }
}
```


NoFeed Intent
Custom.CatFeederGadget
Cleanup
1
def on_custom_catfeedergadget_cleanup(self, directive):
"""
Handles Custom.CatFeederGadget.Cleanup
directive sent from skill
"""
self._reset_feeder()


Alexa, open
cat feeder
Launch Intent
Custom.CatFeederGadget
Init
Welcome to Cat Feeder, would you like to top up the cat food?
no
NoFeed Intent
Custom.CatFeederGadget
Cleanup
yes
YesFeed Intent
Custom.CatFeederGadget
FeedCat
Cat has been fed, Meow!
ReportFeeder Intent




```
// handlers/YesFeed.js
return handlerInput.responseBuilder
    // Send the FeedCatDirective to
    // trigger the feeder.
    .addDirective(FeedCatDirective.build(endpointId))
    // Start a EventHandler for 10 seconds
    // to receive only one
    // 'Custom.CatFeederGadget.ReportFeeder'
    // event and terminate.
    .addDirective(StartEventHandlerDirective.build(
        sessionAttributes.token, 10000,
        'Custom.CatFeederGadget',
        'ReportFeeder', 'SEND_AND_TERMINATE',
        { 'data': "You didn't report a feed took place." }))
    .getResponse();
```

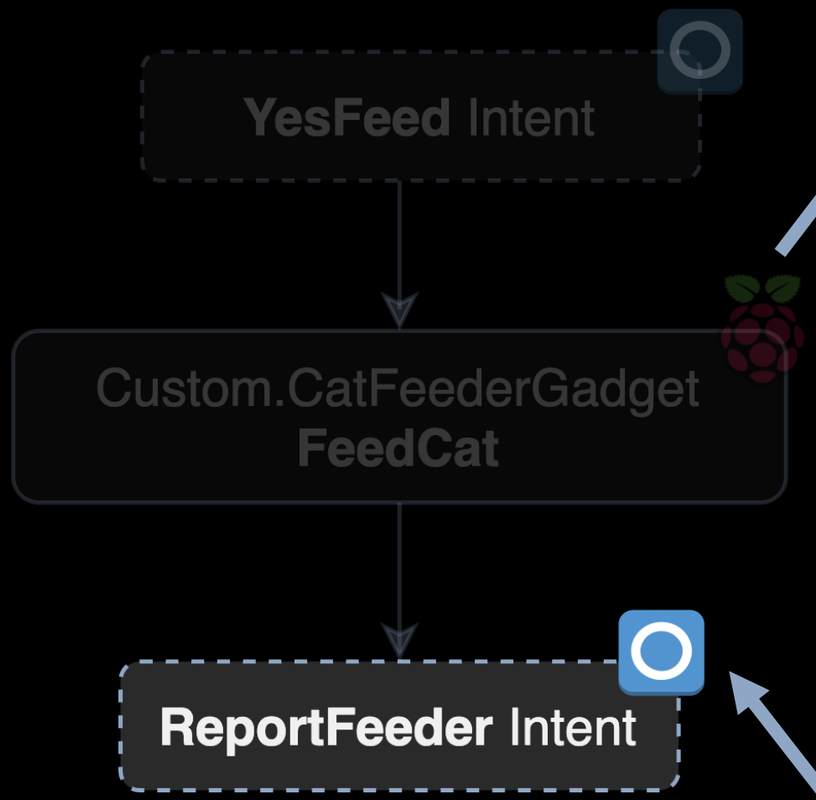



```python
def on_custom_catfeedergadget_feedcat(self, directive):
    """
    Handles Custom.CatFeederGadget.FeedCat
    directive sent from skill
    """
    self._open_feeder(open_feeder=True)

    payload = {'feed': True}
    self.send_custom_event(
        'Custom.CatFeederGadget',
      'ReportFeeder', payload)

def _reset_feeder(self):
    self._open_feeder(open_feeder=False)

def _open_feeder(self, open_feeder):
    SERVO.start(0)
    if open_feeder:
        # PWM Signal to open the servo
        SERVO.ChangeDutyCycle(30)
    else:
        # PWM Signal to close the servo
        SERVO.ChangeDutyCycle(15)
```




```
if (namespace === 'Custom.CatFeederGadget'
 && name === 'ReportFeeder') {
 if (payload.feed) {
      return response.speak('Cat has been fed, Meow!')
          .addDirective(
              CleanupDirective.build(
                sessionAttributes.endpointId
              ))
          .withShouldEndSession(true)
          .getResponse();
  } else {
      return response.speak(
        'Feeder encountered an error responding.')
        .addDirective(
            CleanupDirective.build(
                sessionAttributes.endpointId
            ))
        .withShouldEndSession(true)
        .getResponse();
  }
}
return response
```

Try Alexa Gadgets today!



Easier

- Managed gadgets framework
- Extensive cloud skill set not required
- Unified customer experience



More secure

- Connectivity happens through Alexa
- Device enrolling is baked in
- Shared responsibility model

Thank you!

Nathan Glover
@nathangloverAUS

Senior DevOps
Consultant
Mechanical Rock

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