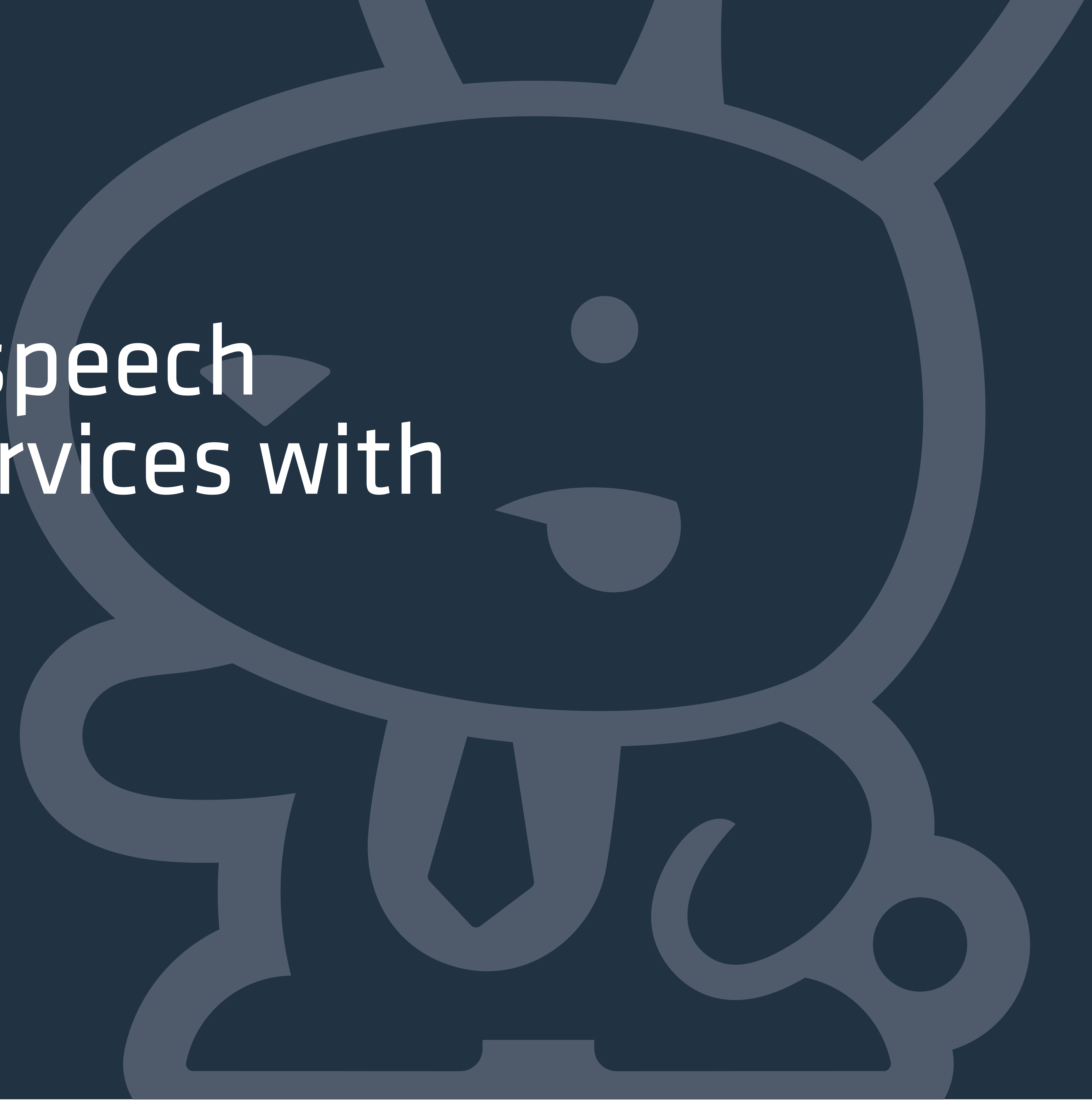
WebRTC and speech recognition services with Adhearsion



Luca Pradovera
FOSDEM 2017

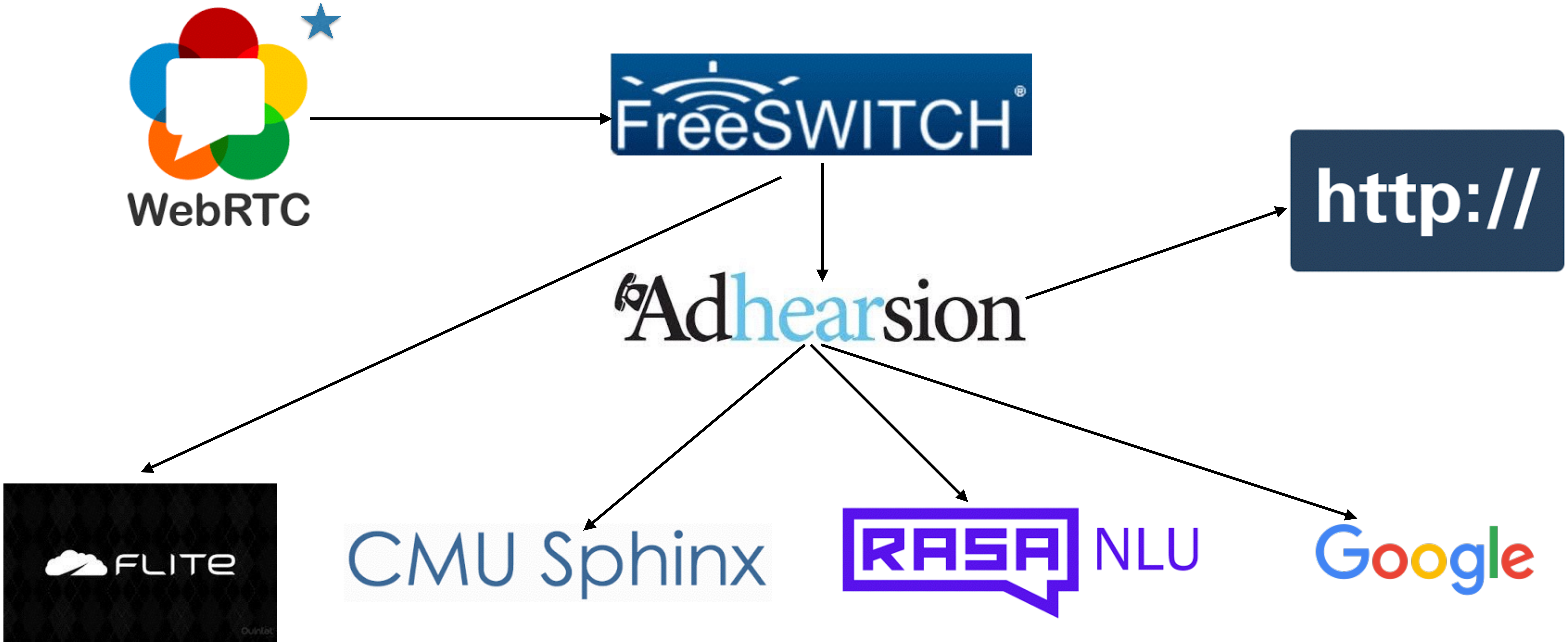
MojoLingo
VOICE APPLICATIONS THAT WORK LIKE MAGIC

WHO AM I?

- Luca Pradovera
- New Principal/Lead at Mojo Lingo LLC
- Adhearsion contributor
- Played with phones since I was 8

DEMO FIRST! (SOMEONE CALL JAMES BODY)

WHAT WAS THAT?



★ The demo might not actually contain WebRTC.
Consult your physician before attempting to configure WebRTC on a local machine.
No keyboards have been harmed during the preparation of this demo. Honest.

MOVING PARTS (ALL OPEN SOURCE)

- FreeSWITCH and mod_verto
- Adhearsion
- PocketSphinx
- Flite
- Rasa NLU
- …and a bunch of others

WHAT IS FREESWITCH?

- SIP-based PBX
- Tons of features
- Very modular
- Very good WebRTC support through mod_verto
- Also check out Asterisk

THE BOT'S EAR AND VOICE

- PocketSphinx provides ASR
- Could be tuned for better results
- Flite provides TTS
- Of course you could use others

FLITE

CMU Sphinx

THE BOT'S BRAIN

- Rasa NLU is a very interesting NLP and ML library
- It replicates services such as Wit.ai, LUIS and Api.ai
- Compatible with many formats and learning models
- We are using the restaurant demo
- https://github.com/golastmile/rasa_nlu

RASA NLU

WHAT DID I LEARN BUILDING THE APP?

- We need a better way to set up FreeSWITCH or Asterisk for WebRTC development
- PocketSphinx is not as bad as the reputation it has (YMMV)
- There is value in running your own “brain”
- Adhearsion removes a lot of complexity

WHY USE ADHEARSION?

WHAT IS ADHEARSION?

- Ruby voice application framework
- Provides 3PCC logic to telephony engines
- Connects to FreeSWITCH using Rayo, to Asterisk using AMI
- Version 2 is stable, version 3 is at rc1
- Backed by Adhearsion Foundation

Adhearsion

WHAT IS NEW IN ADHEARSION 3?

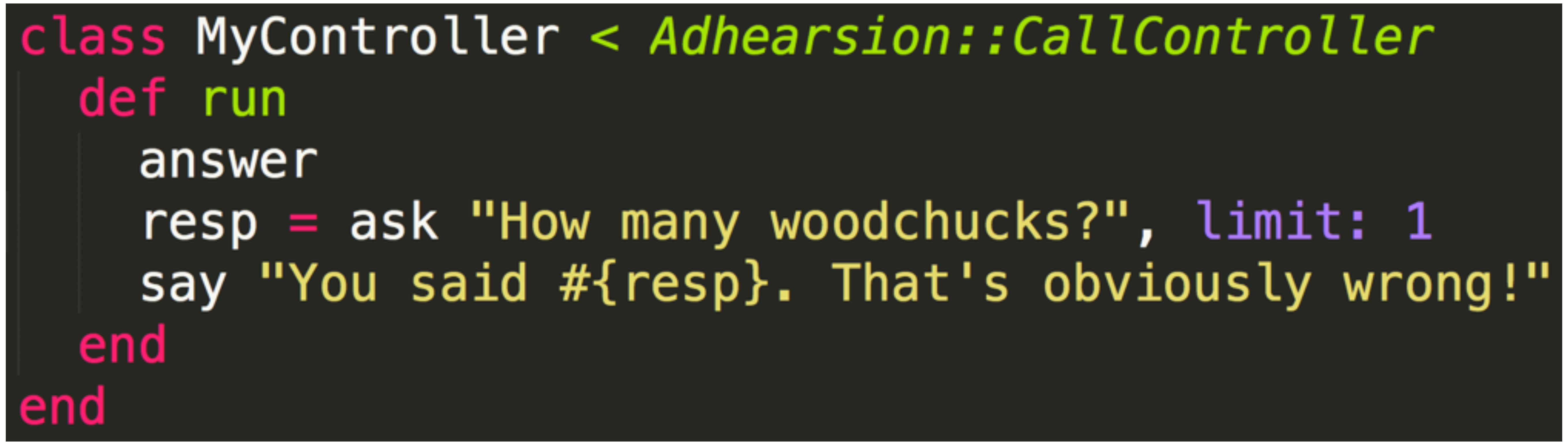
- FreeSWITCH support is Rayo only
- Asterisk 11+ required
- Streamlined internals
- Built in HTTP server
- Native i18n support

WHAT DOES ADHEARSION PROVIDE?

- Plugin architecture
- Voicemail, pseudo-TTS, call queuing plugins
- Platform-specific functionality plugins
- Unified logging
- Clustering via Rayo
- Better deployments using Ruby standards

HOW DOES ADHEARSION WORK?

- Represents phone calls as actors
- Passes messages and events between the engine and the actors
- Each call runs its handling logic in the actor thread



```ruby
class MyController < Adhearsion::CallController
  def run
    answer
    resp = ask "How many woodchucks?", limit: 1
    say "You said #{resp}. That's obviously wrong!"
  end
end
```

GENERAL APPLICATION STRUCTURE

- Controllers group up features
- Routing controls which controller gets a call
- An event handler catches server messages
- Based on Celluloid, operation is generally async and event-based
- DSLs for all common operations (playback, recording, menus)

RAYO PROTOCOL

- XMPP based 3PCC protocol
- Encapsulates voice app primitives
- First-class citizen in FS through mod_rayo
- Calls, speech and TTS, mixing, media
- As a side effect, every Adhearsion node has an XMPP address

http://rayo.org/

RAYO

ADHEARSION ON ASTERISK

- No Rayo support
- Connects via AMI
- Has native command support
- Slightly easier to get started

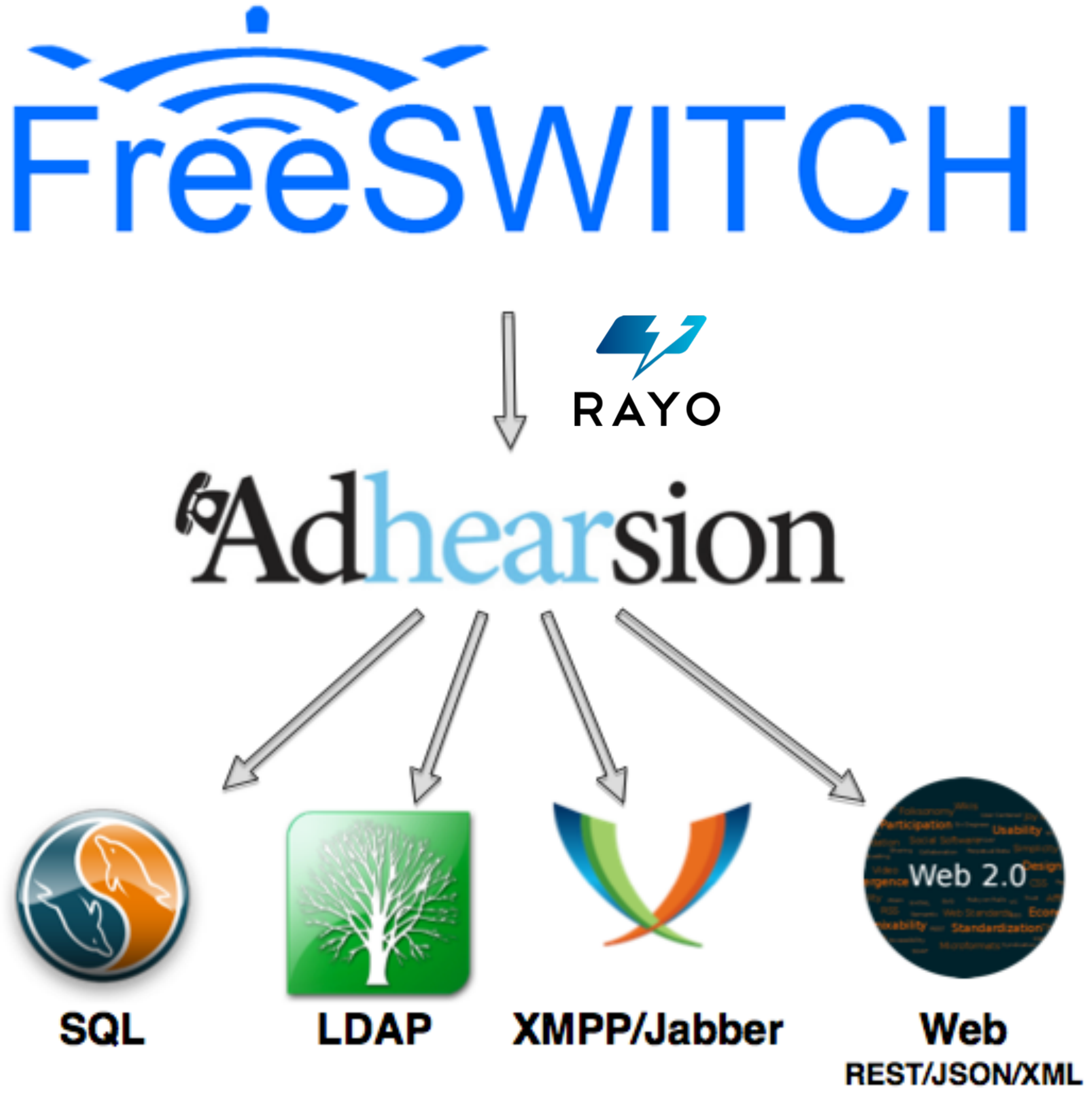
WHAT CAN I DO?

- Calls, conferences
- Media with I18N
- Drive GRXML/SSML based ASR/TTS
- Complex IVRs
- API calls
- Database access
- Built in HTTP server
- Not limited to the dialplan

Everything but the…

HOW IS IT DEPLOYED?

- Any Ruby flavor
- Usually 1-1 with FreeSWITCH
- 12-factor compatible Ruby process
- Easier to scale, provided you have a load balancer



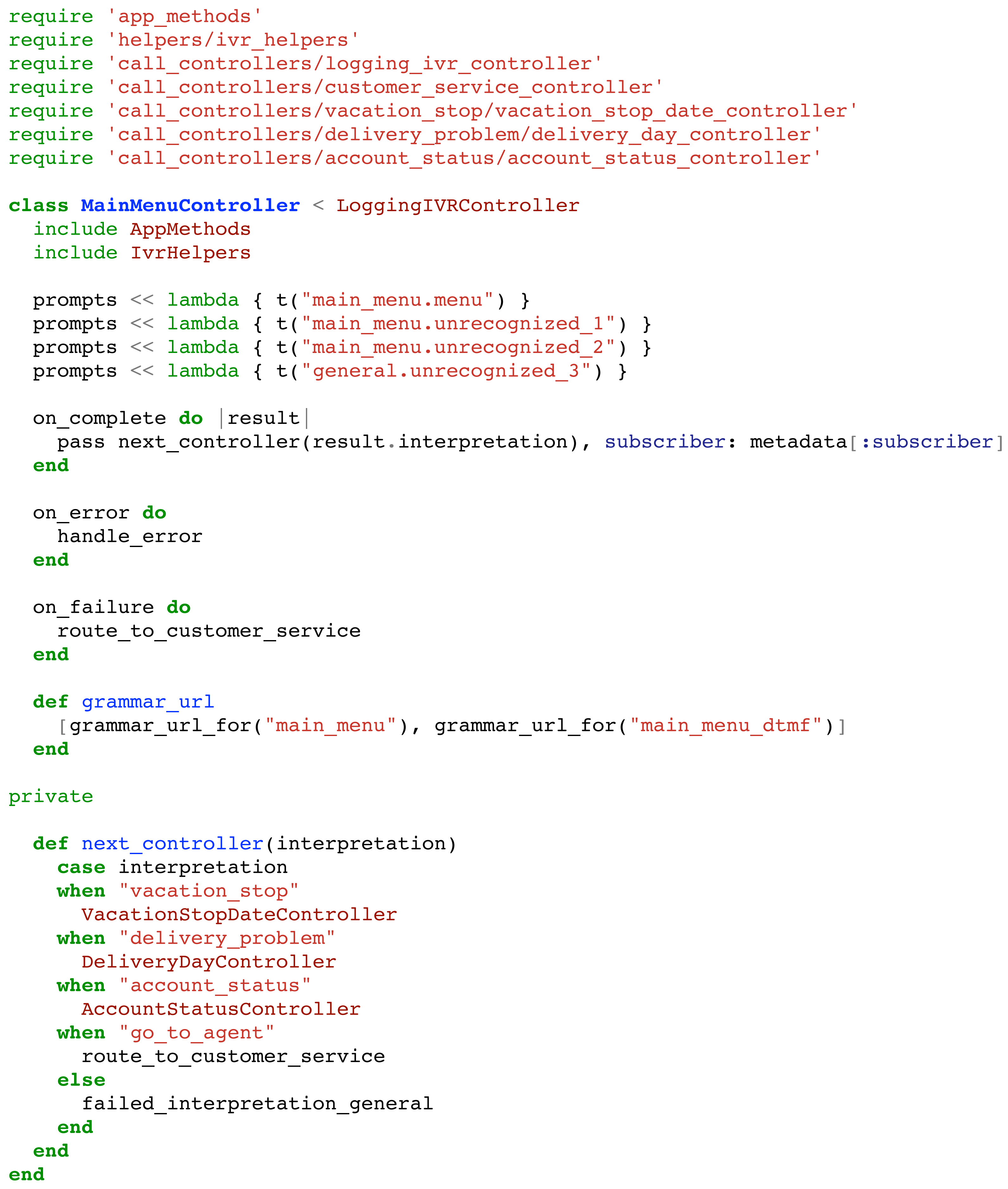
CODE COMPARISON: XML DIALPLAN

- Simple to build
- Nothing to manage
- Difficult to integrate

```
<include>
 <menu name="demo_ivr"
     greet-long="phrase:demo_ivr_main_menu"
     greet-short="phrase:demo_ivr_main_menu_short"
     invalid-sound="ivr/ivr-that_was_an_invalid_entry.wav"
     exit-sound="voicemail/vm-goodbye.wav"
     confirm-macro=""
     confirm-key=""
     tts-engine="flite"
     tts-voice="rms"
     confirm-attempts="3"
     timeout="10000"
     inter-digit-timeout="2000"
     max-failures="3"
     max-timeouts="3"
     digit-len="4">
   <entry action="menu-exec-app" digits="1" param="bridge sofia/$${domain}/888@conference.freeswitch.org"/>
   <entry action="menu-exec-app" digits="2" param="transfer 9196 XML default"/>
   <entry action="menu-exec-app" digits="3" param="transfer 9664 XML default"/>
   <entry action="menu-exec-app" digits="4" param="transfer 9191 XML default"/>
   <entry action="menu-exec-app" digits="5" param="transfer 1234*256 enum"/>
   <entry action="menu-sub" digits="6" param="demo_ivr_submenu"/>
   <entry action="menu-exec-app" digits="/^(10[01][0-9])$/" param="transfer $1 XML features"/>
   <entry action="menu-top" digits="9"/>
 </menu>
 <menu name="demo_ivr_submenu"
     greet-long="phrase:demo_ivr_sub_menu"
     greet-short="phrase:demo_ivr_sub_menu_short"
     invalid-sound="ivr/ivr-that_was_an_invalid_entry.wav"
     exit-sound="voicemail/vm-goodbye.wav"
     timeout="15000"
     max-failures="3"
     max-timeouts="3">
   <entry action="menu-top" digits="*"/>
  </menu>
 <menu name="demo3"
     greet-long="say:Press 1 to join the conference, Press 2 to join the other conference"
     greet-short="say:Press 1 to join the conference, Press 2 to join the other conference"
     invalid-sound="say:invalid extension"
     exit-sound="say:exit sound"
     timeout ="15000"
     max-failures="3">
   <entry action="menu-exit" digits="*"/>
   <entry action="menu-play-sound" digits="1" param="say:You pressed 1"/>
   <entry action="menu-exec-app" digits="2" param="transfert 1000 XML default"/>
   <entry action="menu-exec-app" digits="3" param="transfert 1001 XML default"/>
 </menu>
</include>
```

ADHEARSION CONTROLLER

- Code reuse
- Ruby Gem ecosystem
- Complete language



```ruby
require 'app_methods'
require 'helpers/ivr_helpers'
require 'call_controllers/logging_ivr_controller'
require 'call_controllers/customer_service_controller'
require 'call_controllers/vacation_stop/vacation_stop_date_controller'
require 'call_controllers/delivery_problem/delivery_day_controller'
require 'call_controllers/account_status/account_status_controller'

class MainMenuController < LoggingIVRController
  include AppMethods
  include IvrHelpers

  prompts << lambda { t("main_menu.menu") }
  prompts << lambda { t("main_menu.unrecognized_1") }
  prompts << lambda { t("main_menu.unrecognized_2") }
  prompts << lambda { t("general.unrecognized_3") }

  on_complete do |result|
    pass next_controller(result.interpretation), subscriber: metadata[:subscriber]
  end

  on_error do
    handle_error
  end

  on_failure do
    route_to_customer_service
  end

  def grammar_url
    [grammar_url_for("main_menu"), grammar_url_for("main_menu_dtmf")]
  end

private

  def next_controller(interpretation)
    case interpretation
    when "vacation_stop"
      VacationStopDateController
    when "delivery_problem"
      DeliveryDayController
    when "account_status"
      AccountStatusController
    when "go_to_agent"
      route_to_customer_service
    else
      failed_interpretation_general
    end
  end
end
```

MojoLingo

GIVE US SOME EXAMPLES!

CASE STUDY: RINGRx The phone system for doctors

- The only HIPAA-compliant phone system
- A cloud PBX and an On-Call service
- Features handled by Adhearsion:
  - Conditional routing
  - Voicemail recording and moving
  - Custom message recording and custom IVR
  - Reminder calls
  - …pretty much everything else.

CASE STUDY: LiveConnect

- Surgical procedure broadcast system
- SIP-based because of hardware
- One SIP broadcaster, N WebRTC (mod_verto) or SIP clients
- Adhearsion used for:
  - Managing security and access
  - Conference room participants
  - HTTP API to control flow switching
  - Recording handling

CASE STUDY: POWER HOME REMODELING

- Home renovation company
- 400 Call Center operators
- Outbound for sales and appointments
- Inbound for field agent and installation support
- Every business is a communications business

MORE EXAMPLES?

- Major publishing company phone system for handling delivery accounts, complaints, and services
- At least one MVNO (guess which one)
- Cultural mediator network with online translation

THANK YOU!

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