

**ORACLE®**

# Oracle Digital Assistant

## The Complete Training

### Design Practice: Error Handling Strategies

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# Topic agenda

- 1 ➔ Runtime Errors
- 2 ➔ Design Time Errors

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- 1 ➔ Runtime Errors
- 2 ➔ Design Time Errors

# Runtime errors

- Usually occur in skills
- Component exceptions
  - Misconfiguration (missing required properties)
  - Syntax errors in Apache FreeMarker expressions
  - Custom component runtime exceptions
    - Missing dependencies, parsing exceptions etc.
- Navigation errors
  - Session is in infinite loop
  - Navigation goes to an unexpected state

Choose a destination airport

London
Paris
San Francisco
Munich

London

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

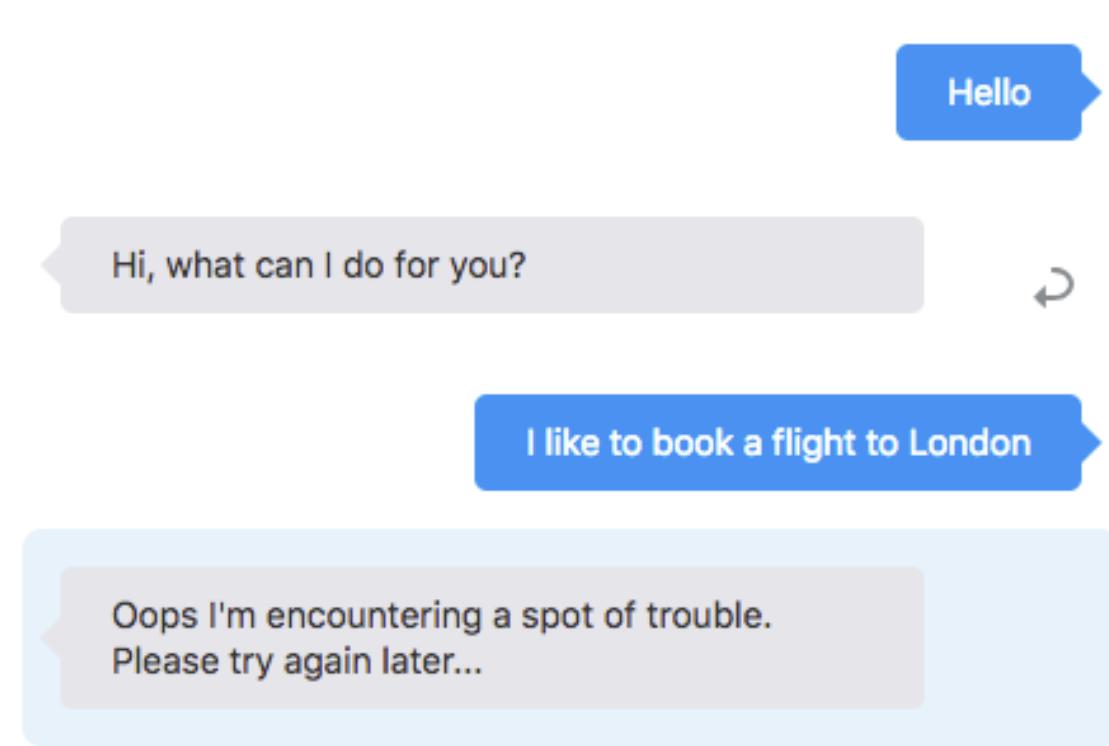
Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

# Runtime Component exceptions

# Component exceptions

```
start:  
  component: "System.Output"  
  properties:  
    text: "Hi, what can I do for you?"  
    keepTurn: false  
transitions:  
  next: "getUserIntent"  
  
getUserIntent:  
  component: "System.Intent"  
  properties:  
    variable:   
  transitions:  
    actions:  
      Booking: "bookFlight"  
      ChangeReservation: "changeReservation"  
      unresolvedIntent: "handleUnresolved"
```



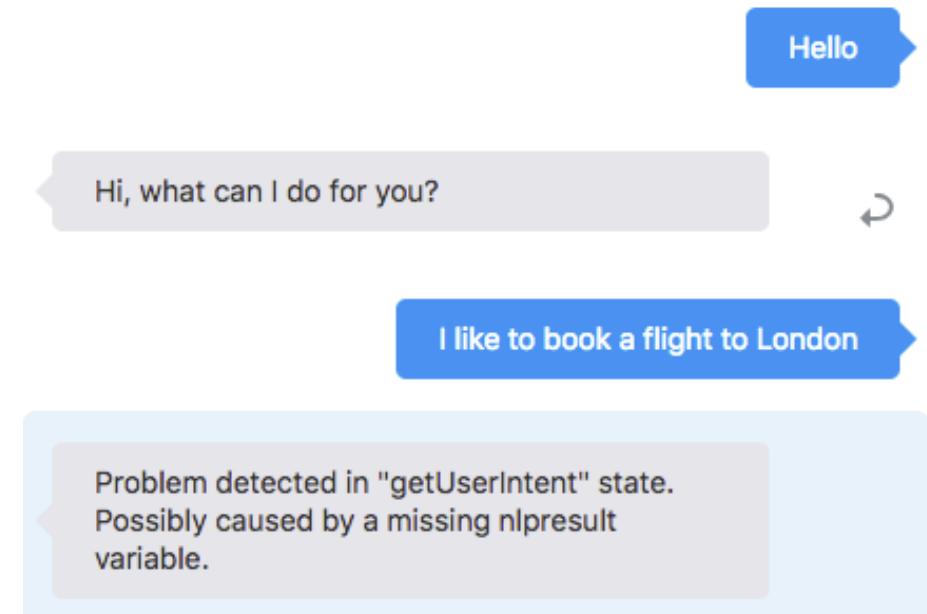
# About component exceptions

- Component exceptions are errors in a system or custom component
  - Missing required properties
  - Runtime exceptions caused by the component logic
- Component errors can be handled by bot designers
  - Using the error transition defined on a dialog flow state
  - Globally, by setting an error transition as a defaultTransition
- If no error transition is defined then the system error handler is used

# Error handling on a individual states

- Handles error for a single state
- Uses "error" transition defined on state

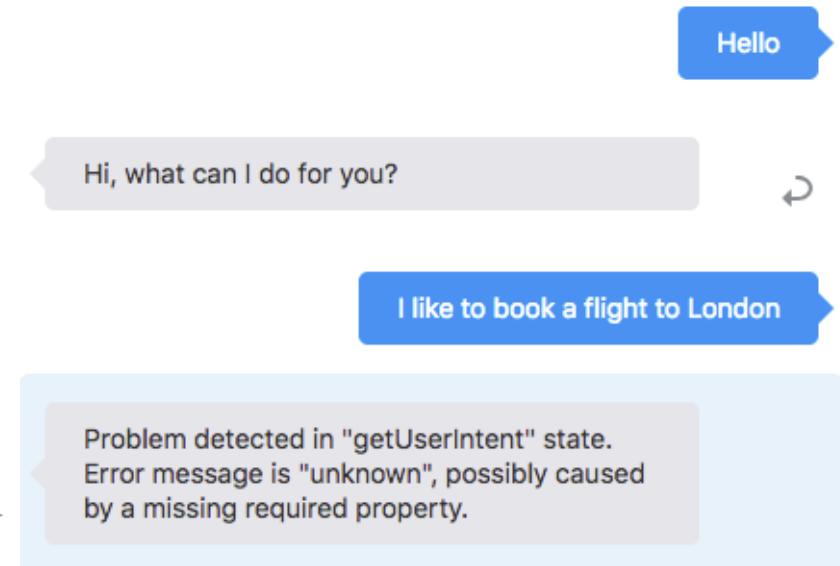
```
getUserIntent:  
  component: "System.Intent"  
  properties:  
    variable:  
  transitions:  
    error: "handleIntentError"  
    actions:  
      Booking: "bookFlight"  
      ChangeReservation: "changeReservation"  
      unresolvedIntent: "handleUnresolved"  
  
handleIntentError:  
  component: "System.Output"  
  properties:  
    text: "Problem detected in \"getUserIntent\" state.  
          Possibly caused by a missing nlpresult variable."  
  transitions:  
    return: "done"
```



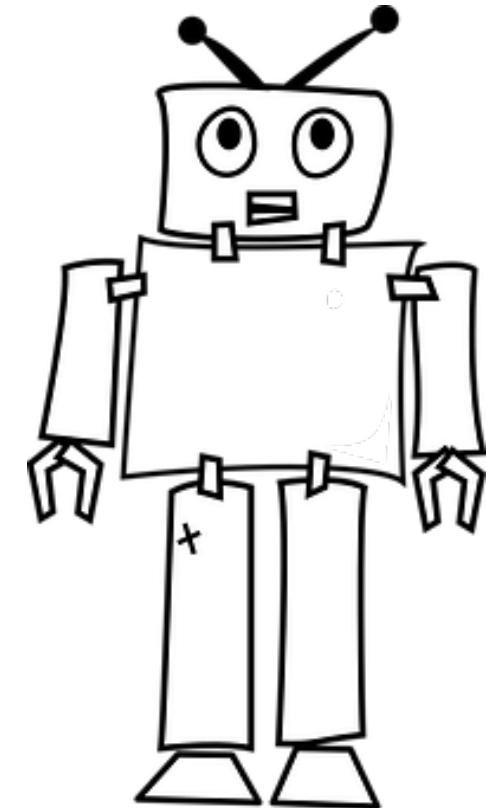
# Global custom error handler

- Uses error transition defined in defaultTransitions section
- Handles errors for all states without an error transition

```
→ defaultTransitions:  
  error: "globalCustomErrorHandler"  
  
states:  
  start:  
    component: "System.Output"  
    properties:  
      text: "Hi, what can I do for you?"  
      keepTurn: false  
    transitions:  
      next: "getUserIntent"  
  
  getUserIntent:  
    component: "System.Intent"  
    properties:  
      variable:  
    transitions:  
      actions:  
        Booking: "bookFlight"  
        ChangeReservation: "changeReservation"  
        unresolvedIntent: "handleUnresolved"  
  
  globalCustomErrorHandler:  
    component: "System.Output"  
    properties:  
      text: "Problem detected in \"${system.errorState}\" state.  
            Error message is \"${system.errorMessage! 'unknown'}  
            possibly caused by a missing required property.'\""  
    transitions:  
      return: "done"
```



Components exceptions show during testing. **Components exceptions** that appear in production often indicate a problem with testing.



# Error handling strategies

- Avoid errors propagating to the system error handler
  - Bad user experience
- Avoid errors in the error handler
  - Be conservative when handling errors
- Use a single location for your error handling
  - Move to bottom of dialog flow so its easy to find
  - Doesn't clutter dialog flow states with error handling routines
  - Use the global error handler with System.Switch component
  - Use local error handling by exception

# Using a single location for all error handling

- \${system.errorState} holds name of dialog flow state that caused an error
- System.Switch compares the name in the error state with state names that bot developer wants to perform local error handling for
- If System.Switch does not find a matching state value for its error state, then NONE is followed
  - NONE directs to a generic (global) error handler

```
defaultTransitions:  
  error: "globalErrorHandler"  
  
↓  
  
globalErrorHandler:  
  component: "System.Switch"  
  properties:  
    source: "${system.errorState}"  
    values:  
      - "getOrderStatus"  
      - "displayOrderStatus"  
      - "createOrder"  
  transitions:  
    actions:  
      getOrderStatus: "handleOrderStatusError"  
      displayOrderStatus: "handleOrderStatusError"  
      createOrder: "handleOrderStatusError"  
      NONE: "UnhandledErrorToHumanAgent"
```

# Runtime

## Navigation errors

# Infinite Loop

- Typically shows during design-time and testing
  - Reoccurring navigation without user input
  - Usually indicates
    - "keepTurn = true" or similar issue
    - Forgetting to reset variable states
    - Custom component problem
- Bot throws error after 100 responses sent without user interaction
  - Not configurable
  - Prevents bot from hanging itself



Your session appears to be in an infinite loop. Please try again later...

# Example

- User selects airport
  - Airport saved in "airport" variable
- Bot detects no seats available
  - Bot redirects user to select another airport
- List component is not rendered because airport variable is not empty
  - Developer forgot to reset variable



# The problem displayed in the conversation tester

Testing Skill      Reset      Conversation      Intent/Q&A      **JSON** →

States

Hi

Choose a destination airport

- London
- Paris
- San Francisco
- Munich

London

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Sorry, we don't have seats available for LHR.  
Please choose another destination

Variables

InfiniteLoop Skill

```
graph TD; A(selectDestinationAirport) --> B(checkAvailability); B --> C(SystemMaxStatesExceededHandler)
```

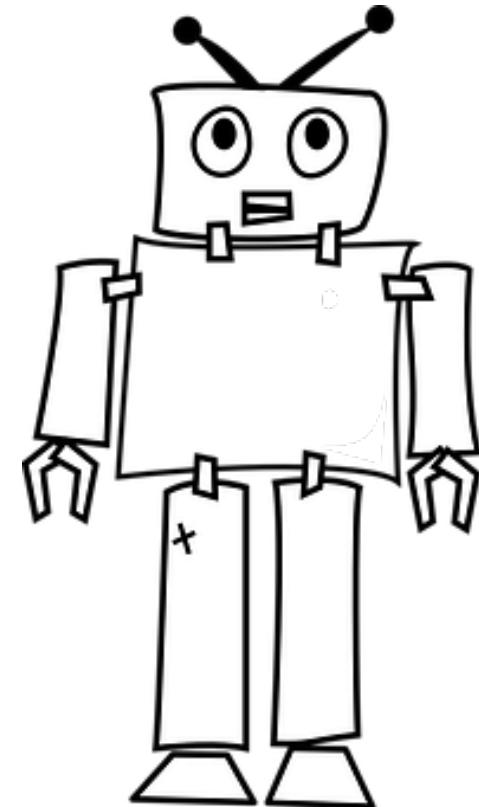
Download JSON

Enter a key or value to search in JSON

```
{
  "currentDialogState": "System.MaxStatesExceededHandler",
  "executedStates": [
    {
      "stateName": "selectDestinationAirport",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    },
    {
      "stateName": "checkAvailability",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    },
    {
      "stateName": "selectDestinationAirport",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    },
    {
      "stateName": "checkAvailability",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    },
    {
      "stateName": "selectDestinationAirport",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    },
    {
      "stateName": "checkAvailability",
      "botName": "InfiniteLoop",
      "botId": "8B58C99E-05B8-41D0-9438-CD41CA17C3A3"
    }
  ]
}
```

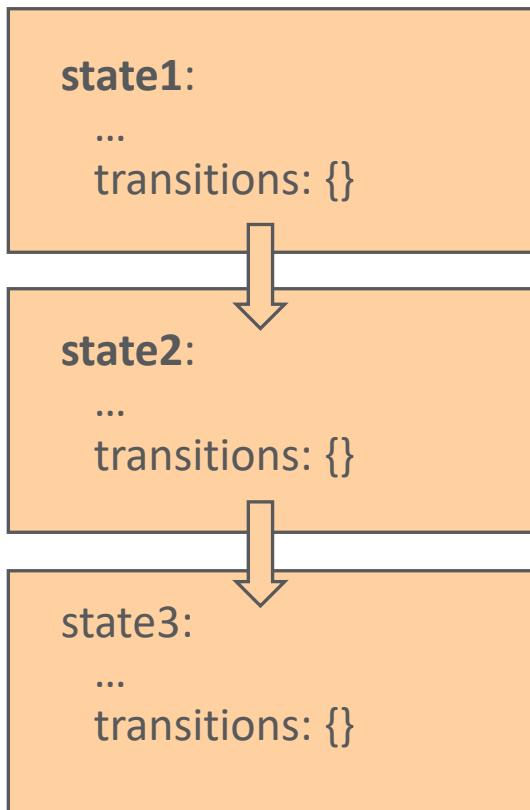
A red arrow points from the 'Variables' section to the 'System.MaxStatesExceededHandler' state in the state diagram. Another red arrow points from the 'Variables' section to the final 'checkAvailability' state in the JSON log.

**Empty transitions often are a  
recipe for errors and can lead  
to unexpected navigation**



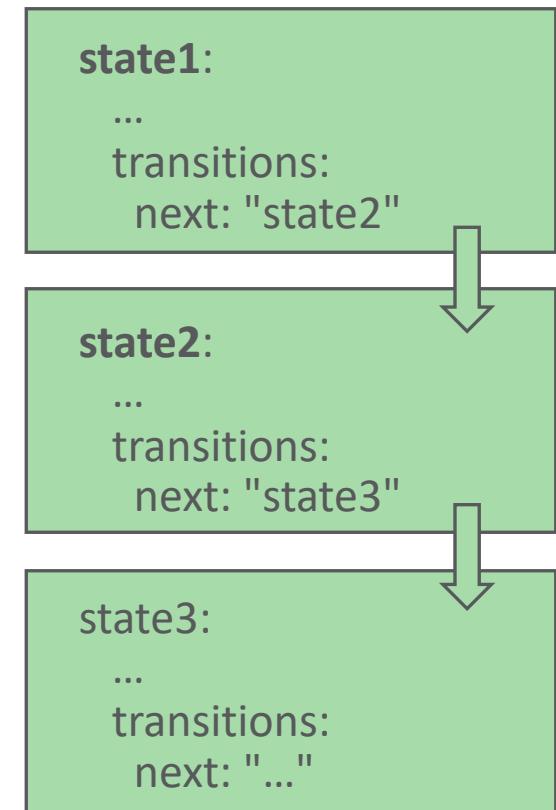
# Empty navigation vs. next transition

Empty navigation



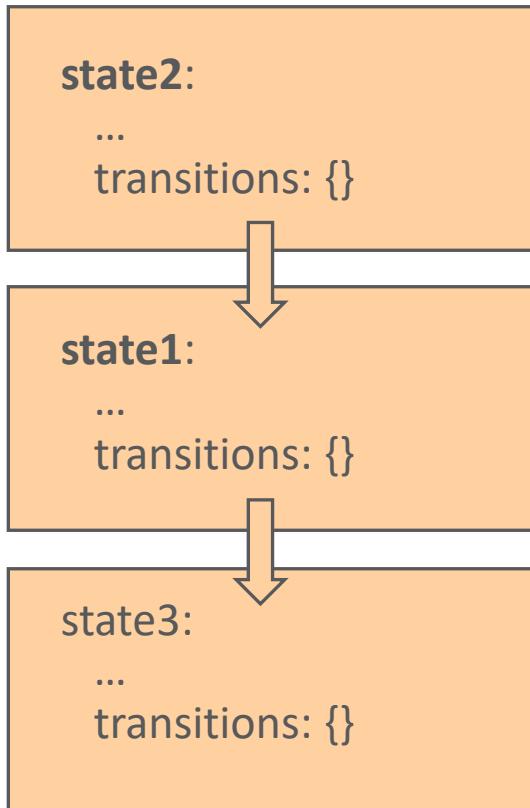
What's the difference?

Next transition

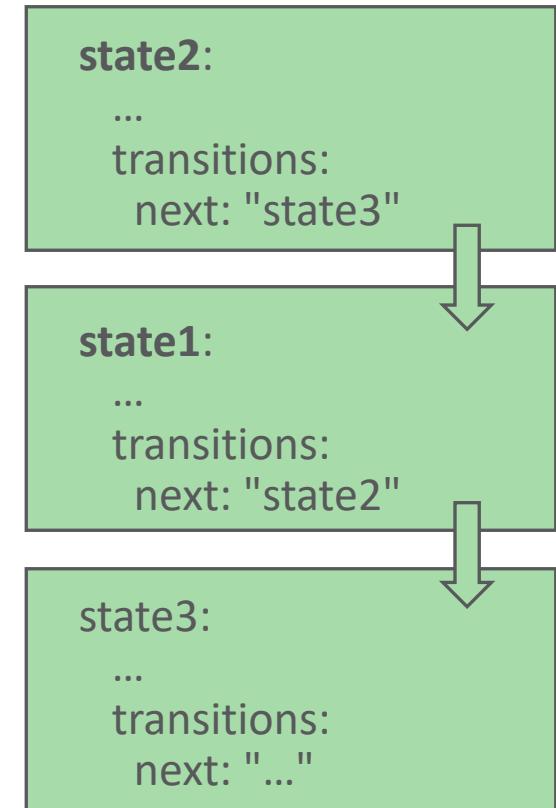


# Empty navigation vs. next transition

Empty navigation



Next transition



What's the difference now?

# Always define a "next" transition

- Prevent unexpected dialog flows
- Define "next" transition on every state
  - Even if you don't need it
  - Requires discipline
- Define "next" as a global transition
  - Use for development and testing only
  - Catches all empty navigation
  - Conversation tester displays executed states
    - Makes it easy to find state with missing next transition

The screenshot shows the Amazon Lex Conversation Tester interface. At the top, there is a code snippet for a Lambda function:

```
defaultTransitions:
  error: "globalCustomErrorHandler"
  next: "alertEmptyTransition"

states:
  start:
    component: "System.Output"
    properties:
      text: "Hi, what can I do for you?"
      keepTurn: true

getUserIntent:
  component: "System.Intent"
```

Below the code, the Conversation tab shows a message from the skill: "Hi, what can I do for you?". A blue arrow points down to a message from the Conversation tester: "Detected empty transition. Check embedded tester for details".

On the right, the Intent/Q&A tab is selected, showing a JSON response:

```
{
  "text": "Detected empty transition. Check embedded tester for details",
  "type": "text",
  "channelExtensions": {
    "debugInfo": {
      "variables": {
        "profile.updatedOn": "2019-02-19T12:41:21",
        "profile.timezoneOffset": -3600000,
        "system.config.system.intentConfidenceWinM
      },
      "profile.lastName": "Chatbot",
      "system.config.system.startState": "",
      "iResult": null,
      "profile.firstName": "Admin",
      "system.config.system.helpState": "",
      "system.config.system.welcomeState": "",
      "system.config.system.intentConfidenceThre
    },
    "profile.locale": "en_US"
  },
  "currentDialogState": "alertEmptyTransition"
}
```

A red box highlights the "executedStates" section of the JSON, which contains two entries:

- { "stateName": "start", "botName": "ComponentErrorHandler", "botId": "B16251C2-AF1B-445C-BD27-DF22DB" },
- { "stateName": "alertEmptyTransition", "botName": "ComponentErrorHandler", "botId": "B16251C2-AF1B-445C-BD27-DF22DB" },

# Topic agenda

- 1 ➔ Runtime Errors
- 2 ➔ Design Time Errors

# Design time errors

- Forgetting to train the model
- Missing required component properties
- Invalid code indenting
  - Two blanks per hierarchy
- Hidden characters after copying and & pasting content
- Missing or duplicated quotes
- Invalid expression syntax
- Setting a semicolon (';') at the end of an expression

# How-to find the trouble maker(s)

- Ensure model is trained if needed
  -  
- Does the intent tester work?
  - If so, then chances are that a System.Intent action references a state that doesn't exist or misses the nlpresult variable reference
- Exclude formatting errors
  - Use validation button
  - Use debugger
- If you can't see an error on the indicated state, how about the state below?



# How-to find the trouble maker(s)

Use the **JSON conversation log**  
in the embedded tester to find  
exceptions and their cause



# Using the embedded conversation tester

Testing Skill      Reset

Conversation    Intent/Q&A    View JSON

I like to order pizza

How old are you?

25

Oops I'm encountering a spot of trouble.  
Please try again later...

States

Variables

system

View JSON

Enter a key or value to search in JSO

```
0.1,
  "profile.timezoneOffset": -3600000,
  "size": null,
  "system.config.system.intentConfidenceWinMargin": "system.config.system.errorUnexpectedErrorPrompt": "Oops I'm encountering a spot of trouble. Please try again later...",
  "system.config.system.startState": "",
  "system.config.system.errorExpiredSessionPrompt": "Your session has expired. Please start again.",
  "profile.firstName": "frank.nimphius@oracle.com",
  "system.postbackActions": {},
  "system.config.system.welcomeState": "",
  "system.config.system.errorMaxStatesExceededPrompt": "Your session appears to be in an infinite loop."
},
  "errorState": "crust",
  "errorMessage": "The component System.Lists was not found.",
  "currentDialogState": "System.DefaultErrorHandler",
  "executedStates": [
    {
      "stateName": "crust",
      "botName": "FNPizza",
      "botId": "058BB32E-B67D-451A-A4A1-F73903F8A70F"
    },
    {
      "stateName": "System.DefaultErrorHandler",
      "botName": "FNPizza",
      "botId": "058BB32E-B67D-451A-A4A1-F73903F8A70F"
    }
  ]
}
```

# Introspect variables

How old are you? 25

What crust do you want for your Pizza? Thick

What size Pizza do you want? Medium

What Type of Pizza do you want?

Variables

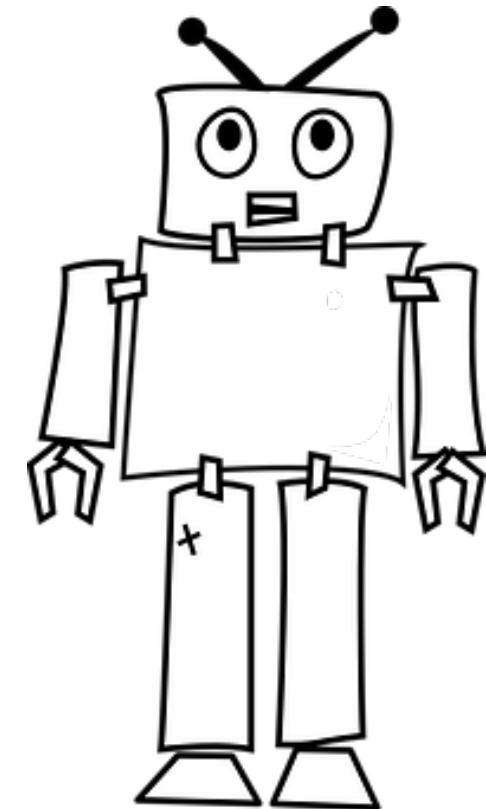
profile.updatedOn: 2019-01-22T17:34:48.659Z  
profile.lastName: Unspecified  
profile.locale: en\_US  
crust: thick  
profile.timezoneOffset: -3600000  
size: Medium  
profile.firstName: frank.nimphius@oracle.com  
userInput  
system  
config  
postbackActions  
▶ small  
▶ large  
▶ personal  
◀ medium  
▶ postback  
label: Medium  
type: postback

## Variables inspector shows

- Context variables and their values
- System variables
  - Profile settings (set by messenger)
    - User name, Locale, Time offset
  - Skillbot parameters (config)
  - Actions settings and postback payloads for menu lists
  - System properties set when using
    - composite bag entities
    - Common response component
    - Resolve entities component

The only source of knowledge  
is **experience**.

- Albert Einstein



# Integrated Cloud Applications & Platform Services

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## Oracle Digital Assistant Hands-On

TBD