VoiceXML Tutorial

Part 1: VoiceXML Basics and Simple Forms

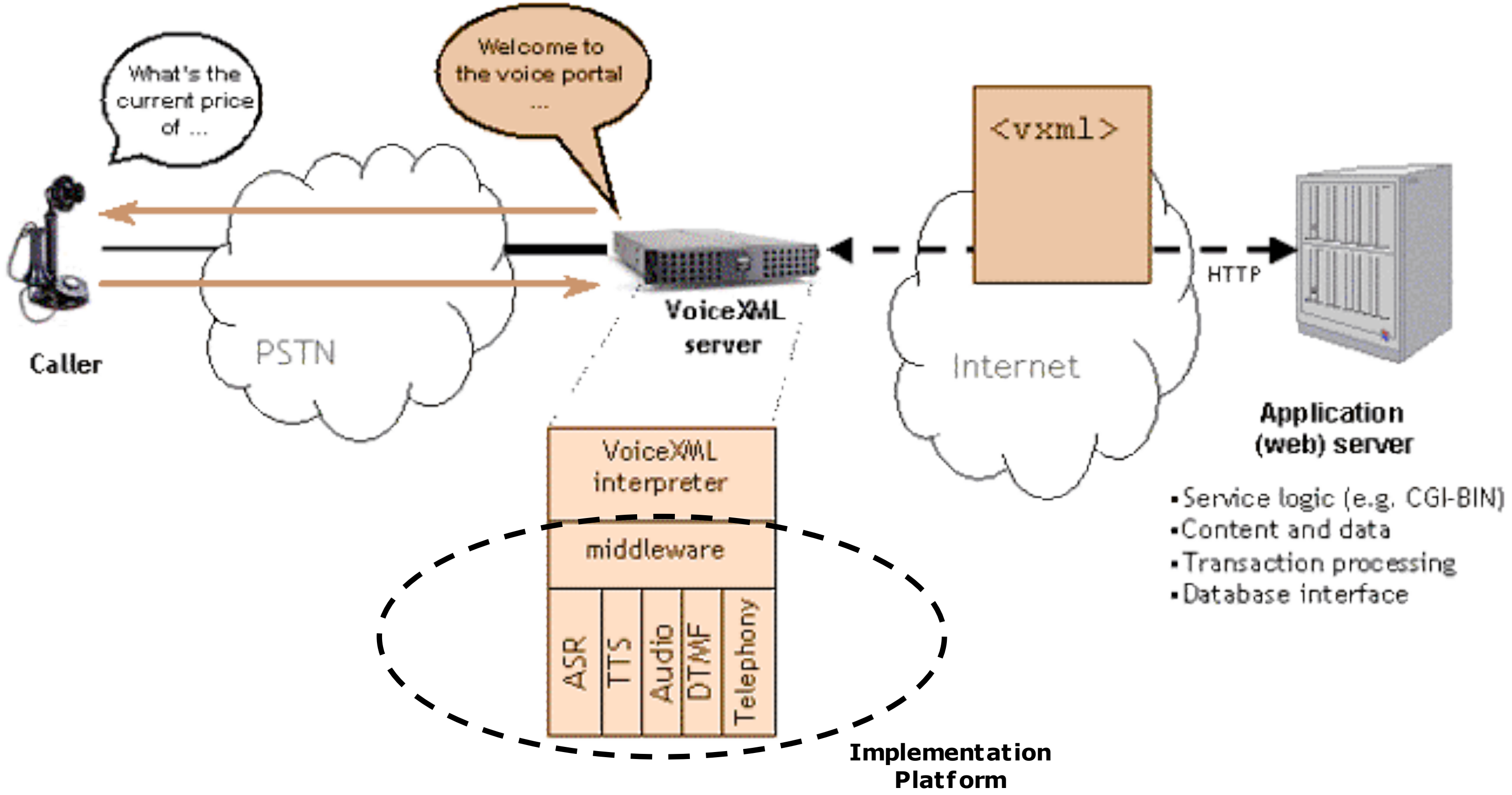
What is VoiceXML?

- XML Application
- W3C Standard
- Integration of Multiple Speech and Telephony Related Technologies
  - Automated Speech Recognition (ASR)
  - Text-to-Speech Synthesis (TTS)
  - DTMF
  - Interactive Voice Response (IVR)
- What to use it for
  - Describe Voice UIs for web content access over the phone
  - Implement Speech-enables telephony applications

VoiceXML Applications

- **Voice portals**
  - Provide personalized services to access information like stock quotes, weather, restaurant listings, news, etc.
- **Location-based services**
  - Receive targeted information specific to the location you are dialing from
  - Applications use the telephone number you are dialing from
- **Voice alerts (such as for advertising)**
  - Send targeted alerts to a user
  - The user would sign up to receive special alerts informing him of upcoming events.
- **Commerce**
  - Implement applications that allow users to purchase over the phone.
  - Mostly used for products that don't need a lot of description (such as tickets, CDs, office supplies, etc.)

The Big Picture



- Service logic (e.g. CGI-BIN)
- Content and data
- Transaction processing
- Database interface

VoiceXML and XML

- Based on XML Tag/Attribute Format
  - Elements **must** be properly nested!

```
<element attr_name=“attr_value”>
   ..contained elements..
</element>
```

- All documents start with

```
                          <?xml version=“1.0”?>
```

- All other instructions are enclosed within the <vxml> tag, called “root element”

```
<vxml version=“2.0”>
   ..VoiceXML Instructions..
</vxml>
```

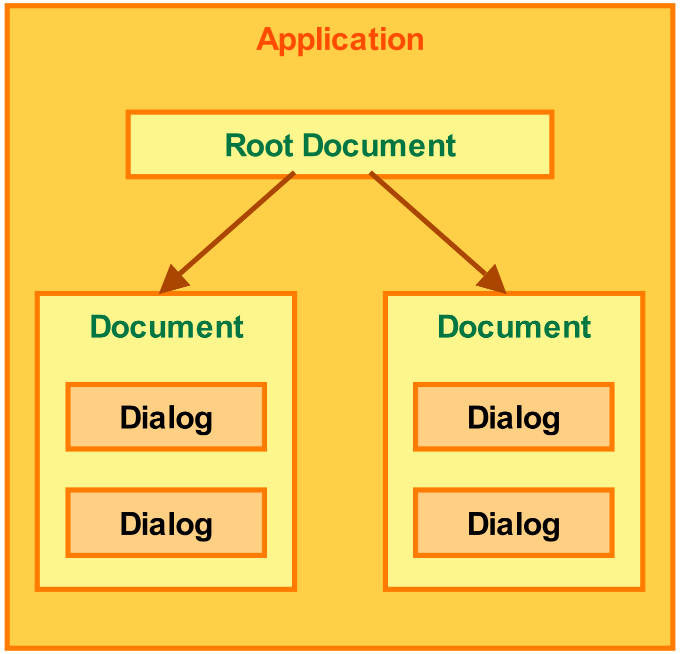
Example 1

Basic Document Layout

```
<?xml version=“1.0”?>
<vxml version=“2.0” >





. . . VoiceXML Elements . . .





</vxml>
```

VoiceXML Application Structure

- VoiceXML documents may be grouped together into applications
  - A root document serves as the initial point of the application
  - Leaf documents are connected to it
- Each document is made up from a set of dialogs
- A session begins as soon as the user begins interacting with a VoiceXML document



Dialogs

- Dialogs are the building blocks for VoiceXML documents
  - Collect data from the user
  - Offer choices to the user
- The user is always in a dialog
  - Each dialog is followed by a new one
  - If no dialog is specified next, the application ends
- Two top-level dialog elements
  - Forms: <form>
  - Menus: <menu>
  - The difference is semantic. The behavior of a <menu> can easily be implemented with a <form>

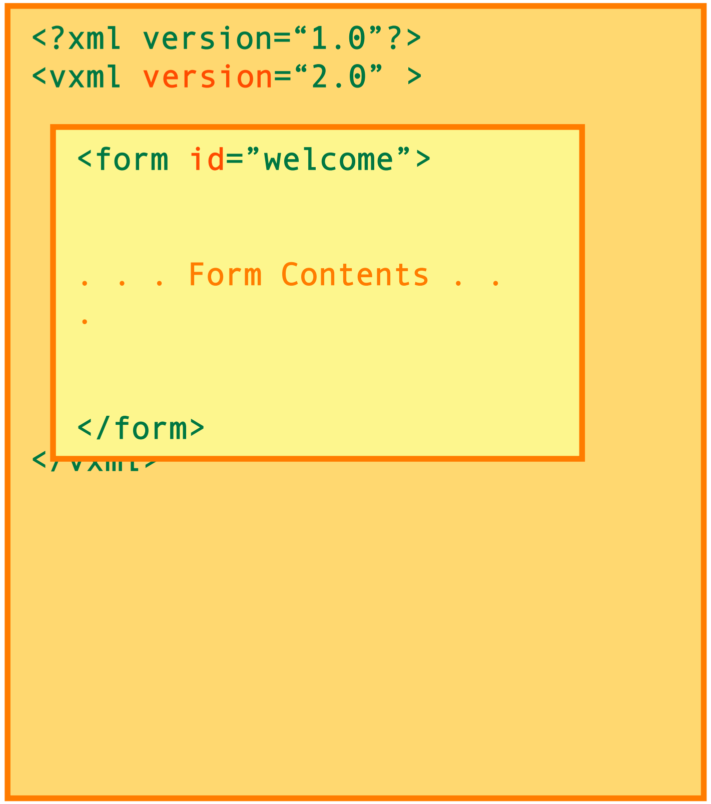
Forms

- Discrete dialog elements
  - Denoted by <form> tag
  - Optional “id” attribute to specify name
  - Responsible for executing some part of the dialog
- Forms contain various elements
  - Elements perform tasks required by form
  - Several, among which those known as “form items”

```
<form id=“welcome”>
  ..elements..
</form>
```

Example 2

VoiceXML Document with Form



```
<?xml version=“1.0”?>
<vxml version=“2.0” >

  <form id=”welcome”>


  . . . Form Contents . . .


  </form>
</vxml>
```

Delivering Content

- Two content delivery methods
  - Text-to-Speech
  - Pre-Recorded Prompts
- <prompt>
  - All text is actually a TTS prompt
  - Enclosure in <prompt> tags provides extra control over its behavior.
- <audio>
  - Typically an 8kHz, 8-bit monaural audio file

Example 3

Hello World!

```
<?xml version=“1.0”?>
<vxml base=“.”
      lang=“en-us”
      application=“intro.vxml”
      version=“2.0”>

   <form id=”welcome”>
     <block>
       <prompt>
         Hello World!
       </prompt>
     </block>
   </form>

</vxml>
```

- Remarks on <vxml>
  - base

    Base URI
  - lang

    Language and Locale type
  - application

    URI of app root document (only for leaf docs)
  - version

    VoiceXML version
- Output:
  - “Hello World!”

Example 4

Prompts

```
<?xml version=“1.0”?>
<vxml version=“1.0”>
   <form id=”welcome”>
     <block>
       <prompt cond=“(new Date()).getDay() == 0” bargein=“false”>
         Sorry! We are closed on Sunday.
       </prompt>
       <prompt cond=“(new Date()).getDay() != 0” bargein=“false”>
         Hello! Thanks for calling.
       </prompt>
     </block>
   </form>

</vxml>
```

- bargein: the ability to interrupt a prompt
- cond: the condition that allows the prompt to be played
- timeout: the time the user has to respond to the prompt without causing an error

Example 5

Pre-Recorded Audio Playback

```
<?xml version=“1.0”?>
<vxml version=“2.0”>
   <form id=”welcome”>
     <block>
       <prompt cond=“(new Date()).getDay() != 0” bargein=“false”>
         Hello! Thanks for calling.
         <audio src=“welcome.wav” caching=“fast” fetchhint=“prefetch”/>
       </prompt>
     </block>
   </form>
</vxml>
```

- src: the file containing the prompt
- fetchhint: when should the browser download this file (prefetch or safe)
- caching: how to manage the cache

Example 6
Simple Dialog

```
<?xml version=“1.0”?>
<vxml application=“intro.vxml”
      version=“2.0”>
  <form id=”welcome”>
    <block>
      <prompt>
        Hello World!
      </prompt>
    </block>
  </form>

  <form id=”name”>
    <block>
      My name is Chris.
    </block>
  </form>
</vxml>
```

- Output
  - “Hello World! My name is Chris.”

Collecting User Feedback

- Grammars
  - A list of permissible vocabulary for the user to select from
  - Two Grammar types
    - Speech Grammars
      - Legal Utterances
    - DTMF Grammars
      - Keypad sequences
- Events
  - Thrown by the application for certain reasons
    - No user input, erroneous input, user request for help

Basic Form Items

- **Field Items:** Gather information from caller to fill variables (field item variables)

<field>	input from user via speech or DTMF, as defined by a grammar

- **Control Items:** Enclose non-recognition based tasks

<block>	encloses sequence of statements for prompting and computation

Example 7

Gathering User Input with <field>

```
<form id=”getPhone”>
  <field name=”PhoneNo”>
    <prompt>
      What’s your phone number?
    </prompt>
    <grammar src=”../grammars/phone.gram”
             type=”application/x-jsgf” />
    <help>
      Please say your ten digit phone number.
    </help>
  </field>
</form>
```

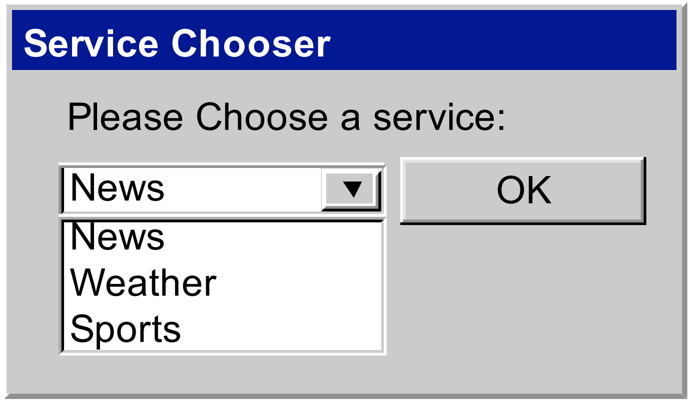
- Prompt user for input
- Recognize input according to specified grammar (type=“phone” utilizes the built-in phone number grammar)
- Catch any events appropriate to portion of dialog
- Fill field variable “PhoneNo” with recognized user response

Form Item Variables

- Associated with every form item
- Defined by `name` attribute
  - Default value: `undefined`
  - Gets filled in with user collected result
- Guard Conditions
  - Default: test whether variable has a value
    - If undefined, form item is executed
    - If defined, form item is skipped

Gathering Data with a Form

```
<?xml version=“1.0”?>
<vxml version=“2.0” >

  <form id=”welcome”>
    <field name=“selection”>
      <prompt>
        Please choose News, Weather
        or Sports.
      </prompt>
      <grammar>
        [ news weather sports ]
      </grammar>
    </field>
    <block>
      <goto next=“choose.vxml”/>
    </block>
  </form>

</vxml>
```



Service Chooser

Please Choose a service:

News