Accessing Information using REST/API – Getting Started

Ingredients:

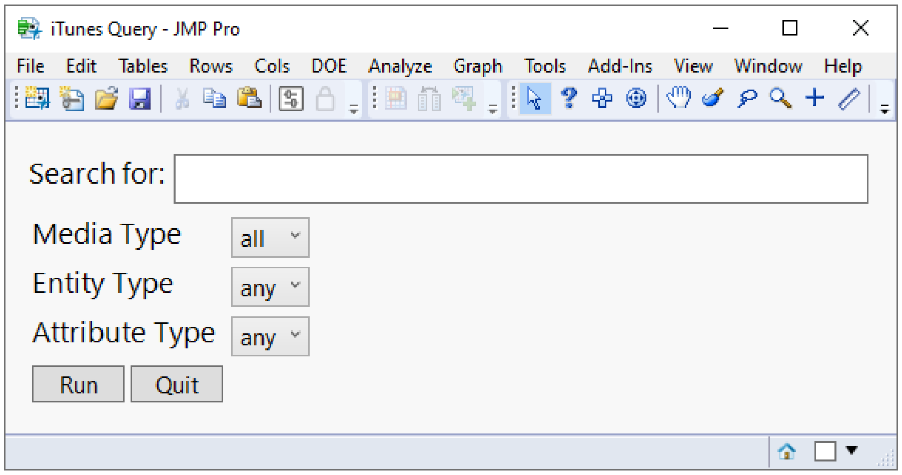
REST/API
Dialog Boxes
Associative Arrays

Difficulty –Hard
Video Length – 6:08

This recipe will focus on JSL's ability to access information through a REST API. We'll be using Apple's publicly available iTunes API. We'll build a small dialog box for user input using associative arrays to implement cascading combo boxes.

Steps:

1. Accessing information via a RESTful API requires four general elements: access authorization, a base URL, an endpoint, and parameter key/query values. This last element is likely the most important and requires knowledge of how to form the parameter key or query. This information should be provided by the API builder but is at times missing or incomplete. Occasionally, a bit of trial and error is needed. We will use Apple's iTunes API because it is relatively simple, requiring no authorization and combines the base URL, search endpoint and parameter key(s) in a single query string. Details on forming the parameter key can be found here. We will use four of the parameter keys: term, media, entity, and attribute. Only term is required (country, despite being marked as required, can be omitted). It takes a text string as input. The other three use values from a list
2. To make searches more user friendly, we will build a dialog box. It will use four input fields, one for text string input, the other three using combo boxes. The general layout will look like this:


iTunes Query - JMP Pro
File Edit Tables Rows Cols DOE Analyze Graph Tools Add-Ins View Window Help
Run
Quit

Search for:
Media Type: all
Entity Type: any
Attribute Type: any

3. `New Window` creates the dialog. It requires a text string as its first argument. The string is used for the window title.

```
Names Default to Here(1);
New Window(iTunes Query");
```

4. We'll use `Border Box` as the outermost container so we can add15 pixels of space to the sides of the dialog. Because border boxes can only take a single element, we will combine everything that follows in `V List Box`.

```
New Window(
  "iTunes Query",
  Border Box(
    Top(15),Bottom(15),Left(15),Right(15),
    V List Box(
    )
  )
);
```

5. Add a `Text Box` to the top to store a warning if the user fails to supply the required search string. Organize the "Search for:" text string and `Text Edit Box` horizontally by putting them in a `H List Box`. Use `Line Up Box` to align the text strings and combo boxes in two columns. The first argument to LUB indicates the number of columns to use. Arrange the button boxes horizontally and center them. We can add spacer boxes to add space between dialog box elements.

```
dialog = New Window(
  "iTunes Query",
  Border Box(
    Top(15),Bottom(15),Left(15),Right(15),
     V List Box(
      Text Box(""),
      H List Box(
        Text Box("Search for: "),
        Text Edit Box("")
      ),
      Line Up Box(N Col(2),
        Text Box("Media Type "),Combo Box({}),
        Text Box("Entity Type "),Combo Box({}),
        Text Box("Attribute Type "),Combo Box({})
      ),
      H Center Box(
        H List Box(
             Button Box("Run"),
             Button Box("Quit")
        )
       )
    )
  )
);
```

6. To make the font bigger, we can use the `Set Font Size` message inside the box constructors. Set the font size for all the text and text edit boxes to 14. When multiple messages are used inside a constructor, they should be separated with commas. Along with the `Set Font Size` message, change the style of the warning message box to `Bold`

```
Text Box("",<<Set Font Size(14),<<Set Font Style(Bold))
```

and set the wrap width of the `Text Edit Box` to 450

```
Text Edit Box("",<<Set Width(450),<<Set Font Size(14)))
```

7. The first argument to `Combo Box` supplies the items populating the box. It must be to a list or evaluate to a list.
   a. We will use a variable to store the list for the Media box. The values will be put at the top of the script to make them easier to access. The value that is selected for this combo box will determine what can go into the other two, so we need a script to execute when a selection is made. The script will be an expression stored in a block of code associated with the variable `changeMediaType`. We'll also add a variable reference to the combo box to make it easier to access.

      ```
      cbMedia = Combo Box(mediaValues,Eval(changeMediaType))
      ```

   b. The values for the Entity and Attribute combo boxes will depend on the Media Type selection. We can use Associative Array to store the values, making them easier to retrieve.

      ```
      cbEntities   = Combo Box(aaEntities["all"])
      cbAttributes = Combo Box(aaAttributes["all"])
      ```

      `aaEntities` and `aaAttributes` are associative arrays and will be defined explicitly at the top of the script. As with the Media combo box, we'll want to associate these two combo boxes with variables.
8. Most dialog box components taking user input can be given a script as their final argument. The script is executed when a user engages the object in some manner specific to the object type. For button boxes, this happens when the button is clicked. We will need a script for both buttons. For the Run button, the script will be stored in the expression associated with the variable `runClick`. It will be used to run the iTunes API query. The Quit button closes the dialog box.

   ```
             Button Box("Run",Eval(clickRun))
         Button Box("Quit",dialog<<Close Window)
   ```

9. The key for both associative arrays, `mediaValues`, is the list we will use the Media Type combo box.

```
mediaValues = {"all","music","movie","podcast","tvShow","ebook","software"};
```

   These values are a subset of values from the API information provided at the link given above.
10. The values for `entityLists` are taken from in [Table 2-1, given here](). The values for `attributeLists` are found at the same location.

```
entityLists = {
   {"any","movie","album","allArtist","podcast","musicVideo","mix",
    "audiobook","tvSeason","allTrack"},
   {"any","audiobookAuthor","audiobook"},
   {"any","ebook"},
   {"any","movieArtist","movie"},
   {"any","musicArtist", "musicTrack", "album", "musicVideo",
    "mix", "song"},
   {"any","genreIndex","artistTerm","albumTerm","ratingIndex","songTerm"},
   {"any","podcastAuthor","podcast"},
   {"any","genreIndex","artistTerm","shortFilmTerm","ratingIndex",
    "descriptionTerm"},
   {"any","software","iPadSoftware","macSoftware"},
   {"any","tvEpisode","tvSeason"}
};
attributeLists = {
   {"any","actorTerm","languageTerm","allArtistTerm","tvEpisodeTerm",
```

```
    "shortFilmTerm","directorTerm","releaseYearTerm","titleTerm",
    "featureFilmTerm","ratingIndex","keywordsTerm","descriptionTerm",
    "authorTerm,"genreIndex","mixTerm","allTrackTerm","artistTerm",
    "composerTerm","tvSeasonTerm","producerTerm","ratingTerm",
    "songTerm","movieArtistTerm","showTerm","movieTerm","albumTerm"},
   {"any","titleTerm", "authorTerm", "genreIndex", "ratingIndex"},
   {"any"},
   {"any","actorTerm","genreIndex","artistTerm","shortFilmTerm",
    "producerTerm","ratingTerm","directorTerm","releaseYearTerm",
    "featureFilmTerm","movieArtistTerm","movieTerm",
    "ratingIndex","descriptionTerm"},
   {"any","mixTerm","genreIndex","artistTerm","composerTerm","albumTerm",
    "ratingIndex","songTerm"},
   {"any","genreIndex","artistTerm","albumTerm","ratingIndex","songTerm"},
   {"any","titleTerm","languageTerm","authorTerm","genreIndex","artistTerm",
    "ratingIndex","keywordsTerm","descriptionTerm"},
   {"any","genreIndex","artistTerm","shortFilmTerm","ratingIndex",
    "descriptionTerm"},
   {"any","softwareDeveloper"},
   {"any","genreIndex","tvEpisodeTerm","showTerm","tvSeasonTerm",
    "ratingIndex","descriptionTerm"}
};

aaEntities   = Associative Array(mediaValues,entityLists);
aaAttributes = Associative Array(mediaValues,attributeLists);
```

`any` is added as the first element of all lists to correspond to any item from the list.

11. We will use an expression to update the Entity and Attribute combo boxes where the Media combo box is change. Using associative arrays makes this simple

```
changeMediaType = Expr(
   cbEntities   << Set Items(aaEntities[cbMedia << Get Selected]);
   cbAttributes << Set Items(aaAttributes[cbMedia << Get Selected]);
);
```

    The list used to populate either outline box for a given media type is associated with the key of the appropriate associative array. The keys are the values used in the Media combo box.

12. The last thing left to do is pull together the user input and send the HTTP request to the API. Everything will be contained in the expression

```
clickRun = Expr(…);
```

    a. Start by checking if the user has supplied the required search string. If not, post a warning and stop.

```
If(Is Missing(searchString),
   tbWarning << Set Text("A search string must be given"),
```

    b. As a reminder, the iTunes API combines the base URL, endpoint, and search parameters. The resulting text string will look like this:

```
"https://itunes.apple.com/search?" || "term=" || searchString ||
   "&media="     || mediaValue ||
   "&entity="    || entityValue ||
   "&attribute=" || attributeValue
```

    `mediaValue`, `entityValue`, and `attributeValue` can all be taken directly from the combo box text. If `all` is selected for `mediaValue`, we can ignore the line. Likewise, if `any` is selected for `entityValue` or `attributeValue`. `searchString` is required.

    c. To build searchString, we start by converting it to URL encoding

```
searchString = tebSearchTerm << Get Text;
searchString = Encode URI(searchString);
```

d. The API needs the space and asterisk (`*`) to be represented by + and `*`, respectively, so we'll change them from their URL encoded values

```
searchString = Regex(searchString,"%20","+",Global Replace);
searchString = Regex(searchString,"%2A","*",Global Replace);
```

e. Putting everything together with conditional `If` statements to account for cases when we can ignore media, entity, or attribute:

```
baseURL ||= "term="||searchString;

If(cbMedia << Get > 1,
   baseURL ||= "&media=" || (cbMedia      << Get Selected));
If(cbEntities << Get > 1,
   baseURL ||= "&entity=" || (cbEntities   << Get Selected));
If(cbAttributes << Get > 1,
   baseURL ||= "&attribute=" || (cbAttributes << Get Selected));
```

f. At a minimum, `New HTTP Request` requires two arguments, `URL` and `Method`, giving the request query and operation, respectively. It acts like an expression and is not executed until it is messaged by `Send`.

```
outData = New HTTP Request(
  URL(baseURL),
  Method("GET")
) << Send;
JSON To Data Table(outData);
```

The iTunes API returns JSON formatted data which is converted to a JMP data table with the `JSON to Data Table` function.

A completed version of the recipe can be found online.

Hints for Success:

- Information about an API is as good as what is provided by its creator. You will likely need a bit of trial and error to get things to work.
- Create a dialog box sketch before writing the code.
- Associative arrays comprised of lists can be used to build cascading combo box when the value from one combo box is used as the key for another.