Study of Exoplanets

(developed by C. Bot and T. Boch)

Uses the VizieR and Simbad services and TOPCAT.

This tutorial deals with the idea of searching for objects based on different criteria, and looking for additional information on the objects found. It involves searching for nearby stars that have massive (>7 Jovian mass) exoplanets with long periods, and gathering information such as the bibliographic references and catalogued spectral types.
It highlights the following functionalities: VizieR queries by UCDs, object selection in TOPCAT, SIMBAD query by scripts.

- launch **TOPCAT**

- go to the VizieR webpage
    - **look for exoplanets catalogs** containing informations on the period: in the search field query with the word "exoplanets", click *Search for catalogs by column descriptions (UCD)* below using the **UCD** "TIME_PERIOD" click *Find Catalogs*
    - choose *Catalog of nearby exoplanets* (Butler+, 2006), click *Show selected catalogs,* **perform a joined query** of table2 and 3 (Exoplanet Host Stars + Nearby Extrasolar Planets) from the nearby exoplanets catalog (Butler+ 2006)
    - select objects for which the minimum mass is greater than 7 Jupiter masses (Msini>7), submit
    - adjust the maximum number of rows in the left menu under Preferences, select "VOTable" and tick "All columns"
    - click "Submit" to download the result as a VOTable file

- load the VOTable in **TOPCAT**
    - **display the data** in a 2D plot (e.g. by plotting the periods against the radii)
    - draw a region in the plot to define a subset of a few data points
    - redefine the columns in the subset table (File -> Duplicate Table) so that it contains only the stellar names associated to the subset data points
    - save this subset to a file in CSV format

- go to the Simbad webpage
    - copy/paste the following **script**:
    ```
    format object form1 "%IDLIST(1) : %COO(A D) %OTYPE
    \n%bibcodelist(2010-2012)[%*\n]\n"
    set radius 0.2s
    query around 55 Cnc
    ```
    [the above script is doing the following:
        -- format object lets you define your own output format
            --- %IDLIST enables you to get **all the existing identifiers** for an object. In this example, one will only get the main identifier thanks to the "1" in the options ()
            --- the script is then asking to display the coordinates (%COO(A D)) and the main object type (%OTYPE) as defined in Simbad

--- this script will also give **all the bibliographical references** on each object, published between 2010 and 2012. This is performed using the option `%bibcodelist(2010-2012)`.
The formating options `[%*\n]` will give a display of only one bibcode per line

-- the line starting with `set radius` defines a research radius in a global manner (i.e. it will apply to all queries)

-- finally, once the format and the query radius are defined, you can specify all the identifiers that you wish to query.
A line like `"query around 55 Cnc"` has to be written for each object to query. To query by coordinates, one could instead write
`query coo 12 30 +40 50]`

o **Hint:** you can get help on the script syntax and the existing options at
http://simbad.u-strasbg.fr/simbad/sim-help?Page=sim-fscript

o complement this script by querying 2 or 3 objects of your choice, taken in the CSV file

o if you wish to mask the script display in the output, as well as the execution details, add the following two lines at the beginning of the script:
`output script=off`
`output console=off`

o execute the script with the "submit" button

- once the result has been displayed, copy the list of bibcodes obtained for a "Planet?" type object and **query the ADS service** by pasting it in the Bibliographic Code Query form at http://cdsads.u-strasbg.fr/bib_abs.html and submit