Implementation of an API for automatic collection of weather information

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Abstract

API (**Application Programming Interface**), is a set of routines, protocols, and tools for building software applications. The API specifies how software components should interact and APIs are used when programming graphical user interface components. In this project, an API interface with Excel is constructed in order to access to weather information generated by the Weather-Underground Network. By using the functions **Webfunction** and **FilterXML** from **Excel** along with the **Weather-Underground API Key**, all of the following parameters are recorded: Outdoor Temperature, Humidity, Barometric Pressure, Light, Precipitation, Wet Bulb Temperature, Wind Speed, Wind Direction, Date, Time, Maximum Temperature, Minimum Temperature, Maximum Humidity, Minimum Humidity, Maximum Pressure, Minimum Pressure, and Gusts. Such access permits to create a database of spatial statistics from different weather stations that belong to the same network. The used protocol might be extended to other weather service providers as Weatherbug and the National Weather Service.

1. Motivations and General Ideas

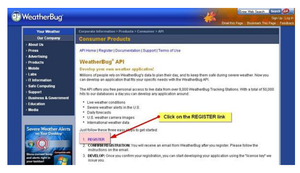
An **Application Programming Interface (API)** is a set of programming instructions and standards for accessing a Web-based software application or **Web tool**. A software company releases its API to the public so that other software developers can design products that are powered by its service.

An API is a software-to-software interface, not a user interface. With APIs, applications talk to each other without any user knowledge or intervention.
With APIs, the communication between applications are managed through something called **Web services**. Web services are a collection of technological standards and protocols, including **XML (Extensible Markup Language)**

Fig 1: Schematic representation of what an API is. The software to software communication channel.

Weather applications are among the most used, after the business – oriented ones. Weather information is of large relevance for hospitality management, pet control and management, ecology, park and recreation, health management and epidemiology, and mitigation and evacuation in case of severe weather events.
Complementing the weather information gathered by the National Weather Service (NWS), Earth Networks (Weatherbug) has the largest Mesonet in the continental USA with more than 8000 automated weather stations (AWS) installed and operational. Gaining an automated access to such large database will permit end-users perform statistical analysis of urban weather conditions and their impact on above mentioned sectors.

Fig 2: Weatherbug pulse API allows users to develop their own weather applications as well as to gain access to weather data for research projects



2. Objectives

- Getting introduced to API programming and implementation.
- Become familiar with weather information which is of relevance for scientific research and applications.
- Apply concepts from database structures and programming.
- Implement the API interface through Excel to gather information from Weather-Underground provider.

3. Methodology and Implementation

In order to accomplish the objectives set for this project, the following steps will be taken into consideration:

1. Identification of weather provider with free access to its API source.
2. Identification of the weather parameters to be used for testing the protocol.
3. Using Excel as a platform to create the database on a local server.
4. Collection of information for one month and verification via graphical representation that the data are accurate and coincide with the ones obtained by the weather provider.

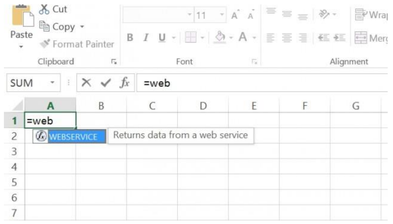
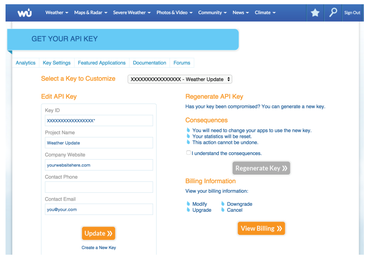


Fig 3: Webservice function in Excel 2013 or pwrWebservice in Excel 2007 and 2010 perform the linking between the applications. In this project, Excel 2013 was used.

4. Results and Discussion

(a)

(b)



(c)

=WEBSERVICE("http://api.wunderground.com/api/93771261cad30672/conditions/q/"&B2&".xml")

=FILTERXML(WEBSERVICE("http://api.wunderground.com/api/93771261cad30672/planner_"&TEXT(A11,"00")&TEXT(B11,"00")&TEXT(A11,"00")&TEXT(B11,"00")&"/q/"&B2&".xml"),"//temp_high//max//F")

Fig 4: The three steps of implementing a weather driven data-query system: (a) identify the company and the subject of interest, (b) get access to the company's API, and (c) identify the application which will do the query and save the requested data (in this project, Excel).

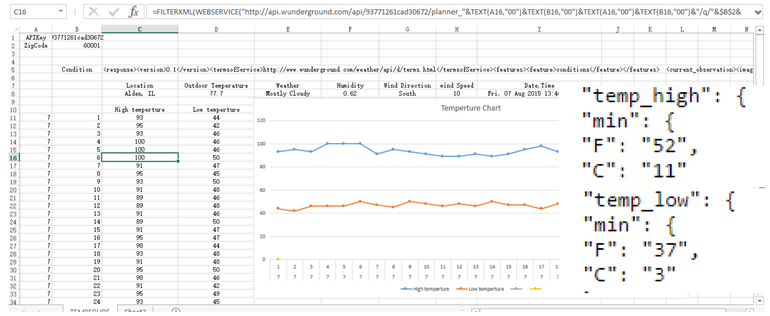


Fig 5: Values of the outdoor temperature obtained via the W-underground API and linked through Excel program. Commands used to retrieve the weather parameters.

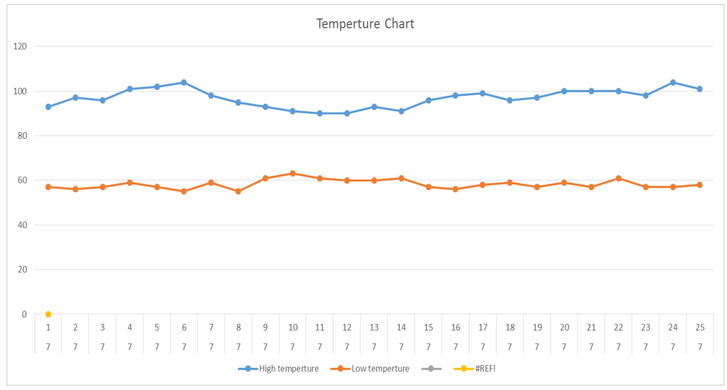


Fig 6: Chart with values of the outdoor temperature obtained via the W-underground API and linked through Excel program.

5. Conclusions

- Local mirrors of large databases might be created based on current technologies deployed at the School of Science, Technology and Engineering Management.
- Excel is a viable resource to create and extract weather information from various weather providers. Excel 2013 is running very slowly in most computers, similar procedures might be done with Excel 2010 by making little changes to the WebService functions.
- These procedures might be extended to the Weatherbug API recently released.

6. Acknowledgments

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7. References

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