Creating Mobile and Web Application Programming Interfaces (APIs) for NASA Science Data

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Abstract

NASA is about making discoveries. Galileo was quoted as saying, "All discoveries are easy to understand once they are discovered. The point is to discover them." To that end, **NASA stores vast amounts of publicly available data.** This poster examines an approach to create web applications that serve NASA data in ways that specifically address the **mobile web application technologies** that are quickly emerging.

Mobile data is not a new concept. What is new, is that user driven tools have recently become available that allow users to create their own mobile applications. Through the use of these cloud-based tools users can produce complete native mobile applications.

Thus, mobile apps can now be created by everyone, **regardless of their programming experience or expertise**. This work explores standards and methods for creating dynamic and malleable application programming interfaces (APIs) that allow users to access and use **NASA science data** for their own needs. The focus will be on experiences that broaden and increase the scope and usage of NASA science data sets.

Process and Results

DATA

Data from NASA data centers provided in .nc .hdf .csv .asc and other formats can be loaded into APIs and used in a multitude of applications

API

With **Google Fusion** Tables or through **RESTful** databases and services users and developers can create content for application development

APP

Using cloud-based and web based development tools, users can create mobile, web, and other applications. These apps create products and generate interest

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NASA Shares Data

The Atmospheric Science Data Center (ASDC) at the NASA Langley Research Center in Virginia houses **almost three petabytes of data**, a collection that increases every day. To put it into perspective, it is estimated that three petabytes of data storage could store a digitized copy of all printed material in U.S. research libraries. There are more than ten other NASA data centers like the ASDC. Scientists and the public use data for **research, science education, and to understand our environment**. Most importantly these data provide the potential for all of us make new discoveries.

Using the Data

The data that is provided from the data centers can be used to create native mobile applications, provide visualization, be used in content for websites, research and web-based applications.
Two methods to create APIs or web services that can be used in other applications:

Representational state transfer (REST)
The REST concept is a style of software architecture for distributed hypermedia systems such as the **World Wide Web**. REST-style architectures consist of clients and servers. Clients initiate requests to servers; servers process requests and return appropriate responses. Requests and responses are built around the transfer of representations of resources. **A resource can be essentially any coherent and meaningful concept that may be addressed.** A representation of a resource is typically a document that captures the current or intended state of a resource.

Google Fusion Tables
With Fusion tables, users can **upload data from spreadsheets, CSV files, or KML files.** Data uploaded can be instantly visualized as a map or a chart. With the data visualized in some web format, it can be embedded into web pages, web applications or **connected with other devices through the Google Fusion Table API.**

Questions about API

What is an Application Programming Interface(API)?

When application developers create software, many times they use APIs to connect and interface with software components. These APIs live and work on the internet and can be accessed by browsers, applications and computers on the internet. **APIs can look and work differently based on a number of different factors.** Some APIs are based on an international standard, Windows, different libraries of a programming language. These languages might be in Python, Java API, C++, PHP, or whatever the API developer decides will suit his or her needs.

What can we do to use NASA data in our own APIs and software development needs?

We can connect to datasets and information that are **provided by the NASA Data Centers across the United States.** By creating our own APIs and ways to serve data, we can then access them with mobile applications and websites, and more importantly other web and mobile application **developers can use the data to publish and make their own products.**

HTML CSS3 JavaScript

HTML, HyperText Markup Language, is the means for describing the content and structure of a document. **HTML5 is the replacement for HTML4** presented to the W3C group in 1999. HTML5 includes features like new structures, support for video and audio, local storage, SVG, canvas, Geolocation and Web Sockets

CSS, Cascading Style Sheets, provides the means for describing the look and formatting of a document. CSS level 3 has been under development since December 15, 2005. It includes features for **border effect, transformations, gradients, backgrounds, animations, transitions, media queries, web fonts** and multi-column layouts.

JavaScript is an implementation of the ECMAScript language. As such it is used to describe the behavior of a document. **Current usage takes advantage** of it being a prototype-based object-oriented scripting language that is dynamic weakly typed and has functions.

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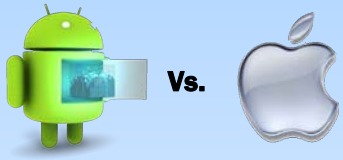
Build Apps for Data

Native Applications
In the past few years the **handheld computing device** has blossomed and has reached nearly every industry throughout the world. Users are constantly looking for new ways to use the data that is publically available. With the **advent of cloud based mobile development tools,** lay users can now create their own mobile applications that utilized the volumes of satellite data housed at the various NASA centers without necessarily knowing how to write code.



Multi-platform Applications
Today, mobile application developers are turning to other means to develop mobile applications for all devices that are **browser capable.** Many web applications that look and feel like native mobile applications are being developed with HTML5, a major extension of the current HTML standard language. Using **HTML5 developers** and users can add rich media content, added functionality and can be used to access mobile-specific features like GPS, camera, email, text messaging, and social media interaction, to their mobile applications **without having to build a platform specific driver.**

Tools and Scripts

- Sencha Touch
- Dojo Mobile X
- Modernizr
- DHMTLX
- Sproutcore Touch
- PhoneGap
- Titanium Appcelerator
- Rhodes
- iUI
- iWebKit
- jQPad
- jQuery Mobile