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INTEGRATING CLOUD PLATFORMS RESEARCH ON INTEGRATION OF FORCE.COM WITH GOOGLE CHARTING LIBRARIES

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Abstract: This paper is proposed as the reference model for integration of a cloud platform, salesforce.com with a charting library, the Google charting libraries. This integration is useful in creating an analytics tool for predicting business intelligence. Firms may commonly apply analytics to business data, to describe, predict, and improve business performance. Salesforce.com is built on an on-demand cloud platform called Force.com. Salesforce has changed the way organizations do business by moving enterprise applications that were traditionally client-server-based into an on-demand, multitenant Web environment, the Force.com platform. This environment allows organizations to run and customize applications, such as Salesforce Automation and Service & Support, and build new custom application based on particular business needs. The Google Chart API is a tool that lets us easily create a chart from some data and embed it in a web page. Google chart tools are powerful, simple to use, and free. This study illustrates how we can integrate two cloud platforms (Salesforce.com and Google) to form a strong business intelligence tool. We can use frameworks like HTML, JavaScript and Visualforce to integrate the user interface with Google charts API. Force.com's Apex language can be used to get the data from database to provide it as an input to Google Charts.

Keywords: Cloud Platforms, Salesforce, Google Charts, Force.com, Integration.

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INTRODUCTION

As users of the Internet, we're all familiar with the fascinating, innovative and creative ways in which it has changed how we work and play. From social networking sites to wikis to blogs, and more, it's exciting to watch the innovations taking place that are changing the ways we communicate and collaborate.

While these changes have certainly impacted how we work with content, a similar set of Internet-driven ideas and technologies is changing how we build and work with business applications. Nowadays various business applications are often integrated with each other to get most out of the multiple systems that we own. Business intelligence tools are no exception. With the customized business intelligence tools we can transform the raw data into a meaningful and useful information for business analysis purposes. With cloud based technologies, it is much easier to integrate various applications and systems.

A. *What is Force.com?*

Force.com is a platform for creating and deploying next-generation cloud apps. Because there are no servers or software to buy or manage, you can focus solely on building apps that include built-in social and mobile functionality, business processes, reporting, and search. Your apps run on a secure, proven service that scales, tunes, and backs up data automatically.

Developing applications on the Force.com platform is easy, straightforward, and highly productive. A developer can define application components, such as custom objects and fields, workflow rules, Visualforce pages, and Apex classes and triggers, using the point-and-click tools of the Web interface.

B. *Why Force.com?*

- **Proven** - More than 100,000+ companies have built 220,000+ apps that run in accredited, world-class data centers with backup, failover, disaster-recovery, and an uptime record exceeding 99.9%.

- **Agile** - Force.com requires minimal coding. We can assemble apps in building-block fashion using visual tools and library of components provided by Salesforce.

- **Social** - Work more effectively with colleagues using Salesforce's own secure social network – Chatter.

- **Mobile** - Run business from phone using the Salesforce1 mobile app. We can build native, browser or hybrid mobile apps powered by a secure cloud database, with rock-solid APIs.

C. ***Analytics in Salesforce***

Salesforce provides powerful reporting and generation tools on the data stored in the objects. Dashboards offer a real-time picture of your business at a glance. We can dig deeper with detailed reports that anyone can create and access your reports and dashboards from anywhere.

- Creating engaging reports is as easy as drag and drop.

Reporting used to be hard, but it's easy with Salesforce. Just drag and drop on the fields, filters, groupings, and charts that you want, and get an immediate real-time view, with instant drill-down to the data you need.

- Get the exact insight you need with easy-to-create custom dashboards.

With Salesforce, you can choose any visualization you want for your data. Easily create custom dashboards via the open reporting API, or drop any chart you want onto any page in Salesforce to get the insight you need.

D. ***What is Google Charts?***

Google Charts provides a perfect way to visualize data in your system. From simple line charts to complex hierarchical tree maps, the chart gallery provides a large number of ready-to-use chart types.

The most common way to use Google Charts is with simple JavaScript that can be embedded in a web page. We need to load some Google Chart libraries, list the data to be charted, select options to customize chart, and finally create a chart object with an id that we choose. Then, later in the web page, we create a <div> with that id to display the Google Chart.

E. ***Google Chart Types***

Currently, line, bar, pie, and radar charts, as well as Venn diagrams, scatter plots, spark lines, maps, google-o-meters, and QR codes are supported.

F. ***Why Integrate Force.com and Google Charts?***

Salesforce CRM has an easy-to-use user interface, lots of features, a wide range of standard reports, and many ready-made extensions. But to get the most from it, we need to customize the application so it works in a way that's right for an industry, a company, and users.

The report builder provided by salesforce.com has its own limitation such as

- showing complex calculations based on multiple sources

- limited visualization

- extensive training required for end users

Google charts API along with HTML, JavaScript, Visualforce, and Apex can help overcome above limitations.

II. Material and methods

As already discussed, Google charts can be integrated with Salesforce using its JavaScript API. Visualforce framework provided by Force.com platform can be used to display integration results (charts) on the user interface (UI). Apex, which is Force.com's multitenant, on-demand programming language for developers, can be used to integrate Salesforce database with the system. This enables us to show real time data from Salesforce database into a meaningful and useful format using Google Charts API. Following sections explain how Apex, Visualforce and Google Charts API work together to successfully integrate Salesforce with Google Charts.

A. *Apex*

Apex is a strongly typed, object-oriented programming language that allows developers to execute flow and transaction control statements on the Force.com platform server in conjunction with calls to the Force.com API. Using syntax that looks like Java and acts like database stored procedures, Apex enables developers to add business logic to most system events, including button clicks, related record updates, and Visualforce pages. Apex code can be initiated by Web service requests and from triggers on objects.

How does Apex Work:

Apex is compiled, stored, and runs entirely on the Force.com platform. When a developer writes and saves Apex code to the platform, the platform application server first compiles the code into an abstract set of instructions that can be understood by the Apex runtime interpreter, and then saves those instructions as metadata.

B. *Visualforce*

Visualforce is a Web-based framework that lets a developer quickly develop sophisticated, custom UIs for Force.com desktop and mobile apps. Using native Visualforce markup and standard Web development technologies like HTML5, CSS, JavaScript, and jQuery, we can rapidly build rich UIs for any app.

## C. *How Visualforce and Apex Code work together?*

Visualforce and Apex complete the application development services of the Force.com platform. With these tools, developers have a full spectrum of customization and development options. They can create pages with salesforce.com's point-and-click tools that rely on the Salesforce CRM application framework and result in an interface with the standard Salesforce CRM look-and-feel.

D. *Google Charts API*

Charts are exposed as JavaScript classes, and Google Charts provides many chart types. The default appearance will usually be all we need, and we can always customize a chart to fit the look and feel of our website/system. Charts are highly interactive and expose events that let us connect them to create complex dashboards or other experiences integrated with your webpage. Charts are rendered using HTML5/SVG technology to provide cross-browser compatibility (including VML for older IE versions) and cross platform portability to iPhones, iPads and Android. So users will never have to mess with plugins or any software.

III. Results and Discussion

By integrating Google charts and Salesforce we are able to generate more intuitive and dynamic charts.
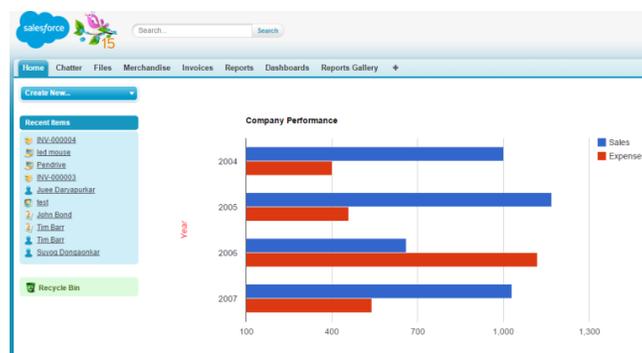
The charts can even be more complex and can involve a complex calculation. Apex is useful in carrying out these complex calculations before a chart is displayed.

We have seen that after integrating the salesforce.com with the chart libraries generated reports are more dynamic and easy to understand. So that client will have more impact of visualization using dynamic charts.as we have seen above example, now we can see that integrating salesforce.com with the Google chart gallery will show the example of perfect visualization of any report so that understanding of any object is easier to the client with the less explanation and higher impact.

ⅣⅤ. Conclusion

From this study, we can conclude that integration is always a beneficial when two high potential systems are successfully integrated. Salesforce is a good choice for developing any application. It has many in-built features and are highly customizable. Google Charts on the other hand is a rich, powerful and free tool available for generating dynamic reports. Apex, Visualforce and Google Charts make it possible to overcome limitations of standard Salesforce reporting features.

Ⅴ. Acknowledgment

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