Load Balancing Employees through BI

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Load Balancing Employees through BI

Smith Systems is a leading technology consulting firm that believes no job is too big or too small. They design networking solutions, administrate servers, and even have multiple development teams allowing the company to work on several large projects in parallel.

Now they are in need of a new system to load balance employees in such a way as to keep all the projects fully staffed and staffed with only qualified employees. To accomplish this they will need to: define the business process, build a data model to represent that process, and finally evaluate a relational versus NoSQL design (Coronel, Morris, & Rob, 2013).

# Defining the Process

The process will begin by declaring a new project and associating it with a customer. Next the project will need to be broken down into smaller tasks that can be assigned to individual contributors and signed off by managers.

Each of these tasks will needs to express the number of people required, the desired skill sets, minimum skill set and expected time to complete the item. When selecting an employee employees with the desired skills are prioritized. If not enough people can be found then less qualified employees will be selected provided they have the minimum knowledge required.

As employees complete training it is their responsibility to get proof of completion and work with the human resource department (HR) to have their records updated. The HR team will then associate the employee with the type of training and date of completion.

Once all data been inserted into the system, management will need to view reports based off this information. In addition to providing project assignment recommendations, the information will answer questions such as: training compliance, identify over or under worked employees, and which projects are going over budget.

# Building a Data Model

Defining the process has flushed out many of the important entities of our model such as: Customer, Project, Task, Employee, and Skill. Each of these is expected to interact with one another through one or more relationships.

## Customer

The customer entity will represent the external business that is requesting a service from Smith Systems. Each customer will have a unique business name, and billing address. From this entity one-to-many relationships will need to exist to contacts and projects.

## Customer Contact

A customer contact entity will need to keep track of the person’s: name, email address, phone and fax number. A reference will need to exist back to the customer that employees them.

## Project

The project entity needs to declare: the name of the project, the start and date, and a reference to the customer that is requesting the work. From this entity one-to-many relationships need to exist to tasks.

## Task

A task represents a schedulable unit of billable work for a project. It needs to bind the desired skill list, minimum skill list, head count, budgeted hours, start and completion dates. The task needs to declare the start date and budgeted hours per day.

Skill lists can be shared between multiple tasks requiring a many-to-one relationship through an intermediate mapping entity.

## Skill List

A skill list entity binds a unique name and maps to skill entities through an intermediate many-to-many mapping entity.

## Skill

A skill entity binds a skill category with a skill trait enumeration. Each skill is made unique based on these two properties.

## Employee

An employee has a name, address, and a reference to a skill list that contains their qualifications.

## Enumeration Entities

All enumerations are defined as having a numeric primary identifier and a description string.

# Challenges with a NoSQL Design

Relational databases are useful for designing systems where the data is located in one data center. However if the data needs to be distributed Grid systems can lead to better performance and scalability (O'Brien, 2008). One Grid based database system is Azure Table Storage (ATS), which is an entity store for holding datasets of enormous size (Richter, 2011, p. 24).

Under ATS each entity is held in a single row and is allowed to have any number of typed case sensitive key value pairs. The keys available do not need to be the same for all entities in the same container (table). There is also not a concept of primary keys or foreign keys similar to most relational models. Instead each row has a partition key and a row key to uniquely identify entities in a container.

If such a database model was chosen, the first challenge would be to partition the data into logical segments. Data that is located on the same partition is assured to be located in the same datacenter, which will significantly improve related query performance. An example partition for Smith Systems could be “North America Projects” and “Europe Projects.”

The next challenge would be dealing with inconsistency data due to fewer constraints, and working under an eventual consistency model. This can be seen in consumers of the data dealing with pointers to objects that: may exist, may not exist yet, or never will exist.

A third challenge would be building the applications to efficiently work with the data in a “chunky not chatty model (Microsoft, 2013).” This means that the clients need to designed to request small specific parts of the data set instead of performing long operations or being able to “select \* from blah.”

# Recommendations

Smith Systems needs to create a database for identifying which employees can be able to work on new projects based on current workload and skills. To build such a system they will need to first define full business process. After the process has been defined the entities can be easily identified and represented in a data model. Finally the data model will need to be implemented in either a rational system or entity database.

# Appendix: Data Model Diagram



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