**Global Computer Solutions Database**

**Application Description**

**Main User Interface**

The main user interface consists of one form, Global Computer Solutions Main. This form allows users to generate reports based on GCS projects, project schedules, employees, assignments, and customers. The form consists of three sections: Project Reports, Employee Skills Reports, and Employee Work Log Reports.

The “Project Reports” section allows users to track the progress, estimates, and possible date variances that exist among created GCS projects. The combo box within this section holds a list of the project ID and description for each GCS project in ascending order. The combo box allows users to select the specific project for their report to be based on and generate a report of: the project’s progress by clicking on the “Project Progress” button, the project’s date and cost estimates by clicking the “Project Estimates” button, or possible date variances with the project by clicking the “Project Date Variance” button.

The “Employee Skills Reports” section allows users to view which employees are associated with which common skill. The combo box within this section holds a list of GCS’ twenty-three skill descriptions in alphabetical order. Users are able to select the specific employee skill to create a report based on and generate the report by clicking the “Employee Skills Directory” button.

Finally, the “Employee Work Log Reports” section allows users/managers to keep track of the actual number of hours worked by employees on a given assignment and the current billing cost for each assignment that has an associated bill ID. Users can access the report by clicking the “Employee Work Log” button.

**Reports**

The GCS database includes five reports that can be accessed through the Global Computer Solutions Main form to help GCS better manage their projects, project schedules, employees, customers and assignments. Three reports are focused on projects and two reports are focused on employees. Each report may include the project ID, customer name, company name, or project description within the header for.

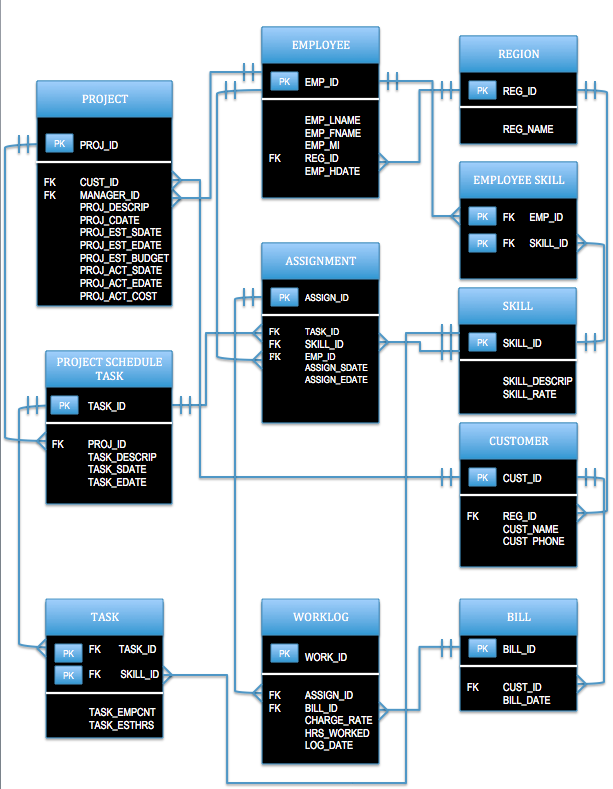
The Project Progress report provides the overall progress of a selected GCS project and the assignments associated with it. The report lists the scheduled/estimated dates and skills associated with the project schedule task, and the actual start and end dates and employees that were associated with the assignment. Each report includes field details for the project task descriptions, scheduled start and end dates, skills, employee full names, and actual assignment start and end dates. The assignment ID is shown as the prefix beside the employee last name.

The Project Estimates report provides estimation details for a specific project. The estimation field details include the estimated start and end dates, skill, employee count, hours, rate and cost that is associated with each project schedule task within the selected project. The “Estimated Cost” column of the project is based on estimated hours multiplied by the rate that is charged for the employee skill. The overall estimated project cost (complete sum of the “Estimated Cost” column) can be found in the bottom right corner of the report. The Project Estimates report allows users to easily access and provide an estimated budget for a given project.

The Project Date Variance report tracks possible discrepancies that may exist between the estimated and scheduled assignment start and end dates. The report lists the project schedule tasks that are associated with the project, along with the task start and end date, skill, employee full name, assignment start and end date, and the start and end date numerical variances. The “Start Date Variance” is the difference of the Assignment and Task start date, and the “End Date Variance” is the difference of the Assignment and Task end date. If the variance is a positive number, the project was started/completed earlier than the estimated date. If the variance is negative, the project was started/completed later than the estimated date. Essentially this report helps users keep track of tasks’ timeframe and whether they were completed/started early, on time, or late.

The Employee Skills Directory report provides a listing of all the employees that are associated with a common selected skill. Since each employee can have many skills and many employees have the same skill, this report allows users to see which employees have the same skill. Information regarding the employee’s ID, name, region, and hire date is included as well. The total number of employees associated with the same skill is provided in the bottom left corner of the report.

Lastly, the Employee Work Log report allows users to keep track of actual hours worked by employees on a given assignment. The report lists the bill ID, assignment ID, employee ID, employee name and hours worked, work log ID and date, and the rate and total cost associated with each work log. The “Total Cost” column is calculated by multiplying the number of hours worked by the employee by the rate charged for the skill. This report helps users track the actual number of billable hours worked on assignments by employees.**ER Model**



**Relational Model**

ASSIGNMENT (**ASSIGN\_ID**, *TASK\_ID, SKILL\_ID, EMP\_ID,* ASSIGN\_SDATE, ASSIGN\_EDATE)

ASSIGN\_ID 🡪 TASK\_ID, SKILL\_ID, EMP\_ID, ASSIGN\_SDATE, ASSIGN\_EDATE

BILL (**BILL\_ID**, *CUST\_ID*, BILL\_DATE)

BILL\_ID 🡪 CUST\_ID, BILL\_DATE

CUSTOMER (**CUST\_ID**, *REG\_ID*, CUST\_NAME)

CUST\_ID 🡪 REG\_ID, CUST\_NAME

EMPLOYEE (**EMP\_ID**, *REG\_ID*, EMP\_LNAME, EMP\_FNAME, EMP\_MI, EMP\_HDATE)

EMP\_ID 🡪 EMP\_LNAME, EMP\_FNAME, EMP\_MI, REG\_ID, EMP\_HDATE

EMPLOYEE SKILL (EMP\_ID, SKILL\_ID)

(EMP\_ID, SKILL\_ID)

PROJECT (**PROJ\_ID***, CUST\_ID, MANAGER\_ID*, PROJ\_DESCRIP, PROJ\_CDATE,

PROJ\_EST\_SDATE, PROJ\_EST\_EDATE, PROJ\_EST\_BUDGET, PROJ\_ACT\_SDATE, PROJ\_ACT\_EDATE, PROJ\_ACT\_COST)

PROJ\_ID 🡪 CUST\_ID, MANAGER\_ID, PROJ\_DESCRIP, PROJ\_CDATE,

PROJ\_EST\_SDATE, PROJ\_EST\_EDATE, PROJ\_EST\_BUDGET, PROJ\_ACT\_SDATE, PROJ\_ACT\_EDATE, PROJ\_ACT\_COST

PROJECT SCHEDULE TASK (**TASK\_ID**, *PROJ\_ID*, TASK\_DESCRIP, TASK\_SDATE, TASK\_EDATE)

TASK\_ID 🡪 PROJ\_ID, TASK\_DESCRIP, TASK\_SDATE, TASK\_EDATE

REGION (**REG\_ID**, REG\_NAME)

REG\_ID 🡪 REG\_NAME

SKILL (**SKILL\_ID**, SKILL\_DESCRIP, SKILL\_RATE)

SKILL\_ID 🡪 SKILL\_DESCRIP, SKILL\_RATE

TASK (TASK\_ID, SKILL\_ID, TASK\_EMPCNT, TASK\_ESTHRS)

TASK\_ID, SKILL\_ID 🡪 TASK\_EMPCNT, TASK\_ESTHRS

WORKLOG (**WORK\_ID**, *ASSIGN\_ID, BILL\_ID*, CHARGE\_RATE, WORK\_HRS, WORK\_DATE)

WORK\_ID 🡪 ASSIGN\_ID, BILL\_ID, CHARGE\_RATE, HRS\_WORKED, LOG\_DATE

**Assumptions:**

* Bold – **Primary Key**
* Italics *– Foreign Key*
* Underline two or more attributes – Composite Key

**Normalization**

The relational model is in fourth normal form. The relational model does not include any repeating groups and all primary keys are clearly identified, therefore the model is not in first normal form. There are no partial dependencies or transitive dependencies present in any table, which eliminates the possibility of the table being in second normal form or third normal form. There are also no independent multivalued dependencies and all values are dependent on the primary key, which also means the relational model is not in Boyce-Codd normal form.

**DDL**

CREATE TABLE ASSIGNMENT (

ASSIGN\_ID Long,

TASK\_ID Long,

SKILL\_ID Long,

EMP\_ID Long,

ASSIGN\_SDATE DateTime,

ASSIGN\_EDATE DateTime,

Constraint ASSIGNMENT\_PK Primary Key (ASSIGN\_ID),

Constraint ASSIGNMENT \_TASK\_ID\_FK Foreign Key (TASK\_ID)

References PROJECTSCHEDULETASK,

Constraint ASSIGNMENT \_SKILL\_ID\_FK Foreign Key (SKILL\_ID)

References SKILL,

Constraint ASSIGNMENT \_EMP\_ID\_FK Foreign Key (EMP\_ID)

References EMPLOYEE);

CREATE TABLE BILL (

BILL\_ID Long,

CUST\_ID Long,

BILL\_DATE DateTime,

Constraint BILL\_PK Primary Key (BILL\_ID),

Constraint BIL\_CUST\_ID\_FK Foreign Key (CUST\_ID) References CUSTOMER);

CREATE TABLE CUSTOMER (

CUST\_ID Long,

CUST\_NAME Text (50),

REG\_ID Text (2),

CUST\_PHONE Long,

Constraint CUSTOMER\_PK Primary Key (CUST\_ID),

Constraint CUSTOMER \_REG\_ID\_FK Foreign Key (REG\_ID)

References REGION);

CREATE TABLE EMPLOYEE (

EMP\_ID Long,

EMP\_LNAME Text (35),

EMP\_FNAME Text (35),

EMP\_MI Text (1),

REG\_ID Text (2),

EMP\_HDATE DateTime,

Constraint EMPLOYEE\_PK Primary Key (EMP\_ID),

Constraint EMPLOYEE \_REG\_ID\_FK Foreign Key (REG\_ID)

References REGION);

CREATE TABLE EMPLOYEESKILL (

EMP\_ID Long,

SKILL\_ID Long,

Constraint EMPLOYEESKILL\_PK Primary Key (EMP\_ID, SKILL\_ID),

Constraint EMPLOYEESKILL\_EMP\_ID\_FK Foreign Key (EMP\_ID)

References EMPLOYEE,

Constraint EMPLOYEESKILL \_SKILL\_ID\_FK Foreign Key (SKILL\_ID) References SKILL);

CREATE TABLE PROJECT (

PROJ\_ID Long,

CUST\_ID Long,

MANAGER\_ID Long,

PROJ\_DESCRIP Text (255),

PROJ\_CDATE DateTime,

PROJ\_EST\_SDATE DateTime,

PROJ\_EST\_EDATE DateTime,

PROJ\_EST\_BUDGET Currency,

PROJ\_ACT\_SDATE DateTime,

PROJ\_ACT\_EDATE DateTime,

PROJ\_ACT\_COST Currency,

Constraint PROJECT\_PK Primary Key (PROJ\_ID),

Constraint PROJECT \_CUST\_ID\_FK Foreign Key (CUST\_ID)

References CUSTOMER,

Constraint PROJECT \_MANAGER\_ID\_FK Foreign Key

(MANAGER\_ID) References EMPLOYEE (EMP\_ID));

CREATE TABLE PROJECTSCHEDULETASK (

TASK\_ID Long,

PROJ\_ID Long,

TASK\_DESCRIP Text (50),

TASK\_SDATE DateTime,

TASK\_EDATE DateTime,

Constraint PROJECTSCHEDULETASK \_PK Primary Key (TASK\_ID),

Constraint PROJECTSCHEDULETASK \_PROJ\_ID\_FK Foreign Key

(PROJ\_ID) References PROJECT);

CREATE TABLE REGION (

REG\_ID Text (2),

REG\_NAME Text (50),

Constraint REGION\_PK Primary Key (REG\_ID));

CREATE TABLE SKILL (

SKILL\_ID Long,

SKILL\_DESCRIP Text (50),

SKILL\_RATE Currency,

Constraint SKILL\_PK Primary Key (SKILL\_ID));

CREATE TABLE TASK (

TASK\_ID Long,

SKILL\_ID Long,

TASK\_EMPCNT Integer,

TASK\_ESTHRS Integer,

Constraint TASK\_PK Primary Key (TASK\_ID, SKILL\_ID),

Constraint TASK \_TASK\_ID\_FK Foreign Key (TASK\_ID)

References PROJECTSCHEDULETASK,

Constraint TASK\_SKILL\_ID\_FK Foreign Key (SKILL\_ID)

References SKILL);

CREATE TABLE WORKLOG (

WORK\_ID Long,

ASSIGN\_ID Long,

BILL\_ID Long,

CHARGE\_RATE Currency,

HRS\_WORKED Integer,

LOG\_DATE DateTime,

Constraint WORKLOG\_PK Primary Key (WORK\_ID),

Constraint WORKLOG \_ASSIGN\_ID\_FK Foreign Key

(ASSIGN\_ID) References ASSIGNMENT,

Constraint WORKLOG \_BILL\_ID\_FK Foreign Key (BILL\_ID) References BILL);

**Data Description**

To better describe the data that was entered into each table within the GCS database, a table has been provided below. Each table description includes the total amount of data records that were placed within each table, a description of the data, and why the data is adequate for demonstrating the sufficiency of the design.

|  |  |  |
| --- | --- | --- |
| **Table** | **# of Records in Table** | **Comments** |
| Assignment | 133 | Data entered within this table includes the assignment ID, task ID, skill ID, employee ID, assignment start date, and assignment end date. Since an assignment associates an employee with a project task, using the project schedule, the data is needed to track which employees and project schedule tasks are being used within assignments. |
| Bill | 5 | Data entered within this table includes the bill ID, customer ID, and bill date. The bill ID is needed to update work log entries. In addition to the bill ID, the data allows users can view the bill date and customer ID associated with a specific bill. |
| Customer | 30 | Data entered within this table includes the customer ID, customer name, customer phone number, and customer region. Because GCS has many customers, it is important to include the data mentioned above so that customers can be uniquely identified. The region data allows each customer to be associated with an employee within the matching region ID. |
| Employee | 30 | Data entered within this table includes the employee’s ID, first, last, and middle initial, region ID, and hire date. This data is needed to associate employees with projects, regions, assignments, and employee skills. |
| Employee Skill | 56 | Data entered within this table includes the employee ID and skill ID. Each employee has many skills and many employees have the same skill. This data allows multiple skills to be associated with multiple employees. |
| Project | 10 | Data entered within this table includes the project ID, customer ID, manager ID, and the project’s description, contract date, estimated start date, estimated end date, estimated budget, actual start date, actual end date, and actual cost. This data is essentially the overall project characteristics, which is what GCS works by, and works in association with employees, customers, and project schedule tasks. |
| Project Schedule Task | 70 | Data entered within this table includes the task ID, project ID, and the task’s description, start date, and end date. This data is essentially a design and development plan where tasks to be performed to take the project from beginning to end are determined by the manager. |
| Region | 6 | Data entered within this table includes the region ID and region name. This data is needed to be associated with customers and employees. GCS pools all of its employees by region and assigned to a specific task scheduled by the project manager. |
| Skill | 23 | Data entered within this table includes the skill ID, description, and skill rate. This data is needed to determine the specific skills that will be associated with a task and assignment. Users are able to generate bills based on the skill rate and hours worked as well. |
| Worklog | 32 | Data entered within this table includes the work ID, assignment ID, bill ID, charge rate, hours worked, and log date. For billing purposes, this data enables users to keep track of the number of hours an employee has worked on a given assignment and the hourly rate associated with the skill used for the assignment. |
| Task | 131 | Data entered within this table includes the task ID, skill ID, task employee count and estimated hours. This data is needed to associate the number of employees, skills and estimated hours needed to complete a task. |