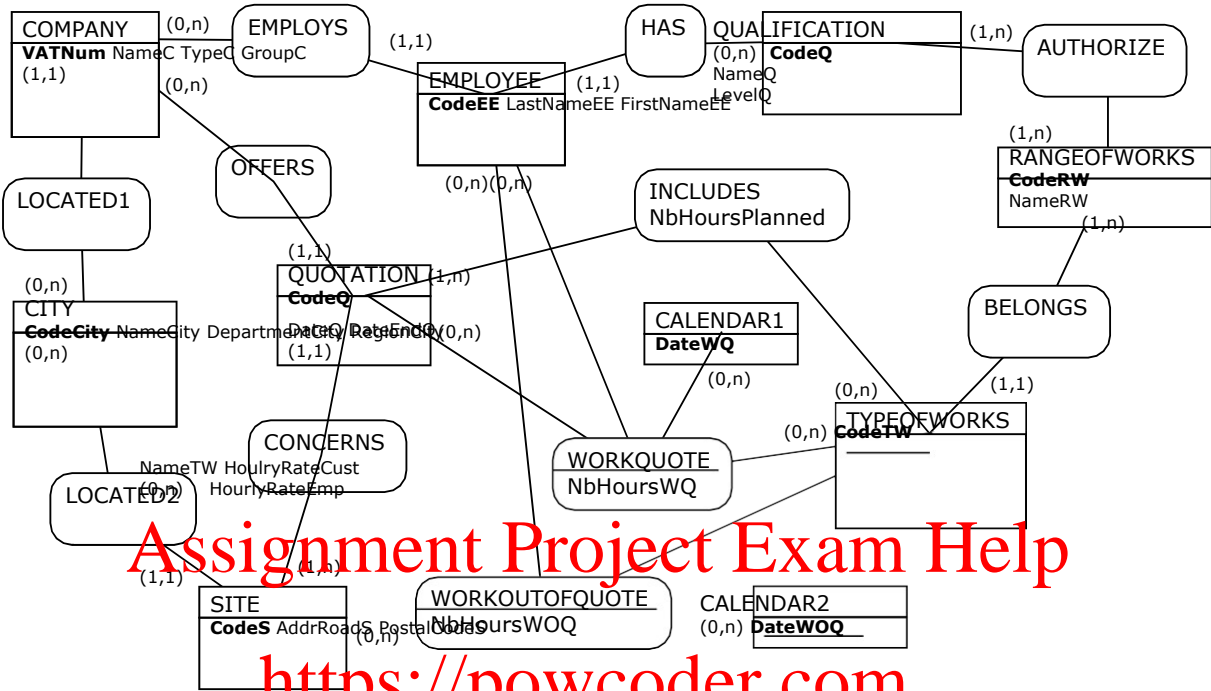# DATABASE PROJECT INSTRUCTIONS

French instructions are further. In case of incoherence or understanding difficulty regarding the present instructions, **English instructions prevail**.

The construction group BatiTP is a company that constructs and renovates buildings and has created a data warehouse. The conceptual schema of the data warehouse (in entity/relationship formalism) is:

COMPANY (0,n) EMPLOYS (1,1) HAS QUALIFICATION (1,n) AUTHORIZE
VATNum NameC TypeC GroupC EMPLOYEE (1,1) (0,n) CodeQ
(1,1) (0,n) CodeEE LastNameEE FirstNameEE NameQ LevelQ
(1,n)
OFFERS RANGEOFWORKS
(0,n)(0,n) INCLUDES CodeRW
LOCATED1 NbHoursPlanned NameRW
(1,n)
(0,n) (1,1)
CITY QUOTATION (1,1) CALENDAR1 BELONGS
CodeCity NameCity DepartmentCity RegionCity CodeQ DateWQ
(0,n) DateQ DateEndQ (0,n) (0,n) (1,1)
(1,1) TYPEOFWORKS
(0,n) CodeTW
CONCERNS WORKQUOTE
NameTW HoulryRateCust NbHoursWQ
HourlyRateEmp
LOCATED2 (0,n)

Assignment Project Exam Help

(1,1) WORKOUTOFQUOTE CALENDAR2
SITE NbHoursWOQ (0,n) DateWOQ
CodeS AddrRoadS PostalCodeS (0,n)

https://powcoder.com

This data warehouse allows monitoring the activity of the different companies that work on construction sites from the initial quotation all the way to doing the works on the construction sites.

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A construction work estimate is expressed using a quotation that is made by a company and concerns a construction site located in a city. Each quotation specifies a provisional number of hours for each type of construction work (such as: masonry, electricity, etc.). Each type of construction work is described by a name an hourly rate charged to the customer (to calculate the total price of the quotation) and another hourly rate used to pay the employee (to calculate the salary of the employee). Each type of construction work belongs to only one range of construction works (such as: structural work, finishing work, etc.).

Construction works are done either according to a quotation or out of a quotation. If it is according to a quotation, the daily number of hours done by an employee for each type of construction work is recorded, for each quotation. If the construction works falls out of a quotation, the daily number of hours done by an employee for each type of construction work is recorded for each construction site.

All employees are employed by only one company, and have only one qualification. Each qualification has a code, a name and belongs to only one level of qualification. This level corresponds to one of the following values: BEP, CAP, Bac Pro, BTS or Engineer (these are French diplomas). Moreover, all qualifications are associated to at least one range of construction works, allowing the employee to execute that range of construction works.

All companies are identified by a code (the company tax number), a name and a geographic location using the city, department number (French administrative division) and region. All companies are only of one type (for example: Plc—SA in French, Ltd—SARL in French, etc.) and belong to only one group that correspond to groups of companies.

The Entity/Relationship schema corresponds to the following relational schema where primary keys are underlined and foreign keys are followed by a #.

- **Company** (VATNum, NameC, TypeC, GroupC, CodeCity#)
- **Employee** (CodeEE, LastNameEE, FirstNameEE, CodeQ#, VATNum#)
- **City** (CideCity, NameCity, DepartmentCode, RegionCity)

►	**Site**	(CodeS, AddrRoadS, PostalCodeS, CodeCity#)
►	**Qualification**	(CodeQ, NameQ, LevelQ)
►	**Authorize**	(CodeQ#, CodeRW#)
►	**RangeOfWorks**	(CodeRW, NameRW)
►	**TypeOfWorks**	(CodeTW, NameTW, HourlyRateCust, HourlyRateEmp, CodeRW#)
►	**Include**	(CodeQ#, CodeTW#, NBHoursPlanned)
►	**Quotation**	(CodeQ, DateQ, DateEndQ, VATNum#, CodeS#)
►	**WorkQuote**	(CodeQ#, CodeEE#, DateWQ, CodeTW#, NBHourWQ)
►	**WorkOutOfQuote**	(CodeS#, CodeEE#, DateWOQ, CodeTW#, NBHourWOQ)

The attributes (or columns or fields) of this schema are defined in the data dictionary at the end of this document.

Work to be done

The project is divided into two parts which have to be handed in at two different dates. The first part consists in **Implementation and manipulation of the data warehouse (DW)**; and the second part consists in **Implementation of a multidimensional data mart based on Business Objects**.

1. Part 1: Implementation and manipulation of the data warehouse (DW)

1.1. Implement this data warehouse as a database using Microsoft Access (the data dictionary detailing the different columns is provided hereafter);

1.2. Enter data within the warehouse (i.e. fill in the tables with data) using the same technique as suggested during the course (enough data to test your queries—see below);

1.3. A first group of users is in charge of studying the benefits and margins of the different construction works done on the construction sites. Their requirements as users correspond to implementing the following analyses using SQL queries.

    1.3.1. Display the construction work ranges (code and name) with the average margin made on the construction works (whether it corresponded to a quotation or not);

    1.3.2. Give the code and date of quotations that contain only structural works;

    1.3.3. List the names, codes and address of the construction sites that should be the most profitable. To be profitable for this company is to have a ratio of (customer hourly rate – employee hourly rate) divided by the employee hourly rate greater than 80%);

1.4. Write also a new SQL query of similar complexity that would complete the current decisional analyses of the users of this data warehouse. Justify your answer by stating the advantage(s) of this new analysis compared to the user's requirements (the 3 queries described above).

Elements to hand in are: a **dossier** (a pdf file that contains a **design report** and a **user guide**) that has the layout described hereafter and **Files** that contain the different implementations (Access database).

Structure of the **Design report** (sections 1 to 3 and 5 to 15 pages at most): this report will detail the implemented solution. The report describes the solution and recalls the specifications (the objectives specified in the present instructions). The following layout is mandatory for writing the report:

1. Present the **architecture** of the decision support system using text and a schema

    1.1. Description: For the decision maker (users), specify the requirements (at least on paragraph). Recall that those user-requirements are stated within the project description. Moreover, in addition to this informal part, it is necessary to provide a synthetic view of the user requirements using a table with the following columns (the column names are given in italic):

        • *Name* of the data mart: a short name to be used in the global schema (see below);
        • *Description* of the data mart: a long title describing the data mart such as "this data mart allows analysing…"
        • *Desired tool*: mention if it is a spread sheet tool, a database (DBMS), an OLAP query tool (such as Business Object), etc.
        • *Decision-maker* that are concerned by that data mart.

    1.2. Schema: a schema of the decision support system will have to be provided using explicit logos for the different components of the system as well as using the names described in the table in 1.1. This schema must be associated to a comment (composed of one or several small paragraphs) and describes the architecture (software and interconnections) of the decision support system. You can base your schema on the architecture schemas that were provided during the first course.

2. Details of the data mart you will need to provide **an analysis of the user requirements** as well as the **detailed design** (as done in course and during exercises).

        • For a data mart that uses a database (with SQL queries):

            o State the precise and detailed requirements of the decision makers for specifying their analysis;
            o Data: provide one conceptual schema that answers to these requirements, i.e. all queries (entity relationship and relational schemas) as well as the data dictionary. Recall that the whole data warehouse schema may not be necessary. All this information is provided with the present instructions (note that to draw the schemas you can use PowerPoint);
            o Processes: SQL queries associated to the decisional analyses with possible comments as well as the analysis requirements (the sentence that describes each query).

3. For the data warehouse, it is necessary to provide the global and detailed design. Recall that, within this project, the description of the data warehouse is described in the beginning of the present document.

        • Data: the conceptual schema of the whole data warehouse (in entity relationship and relational format) along with a data dictionary. All this information is provided in this document;

4. Structure of the **User guide** (section 4 and 1 to 3 pages at most):

    4.1. Provide a brief description of all the files handed in, using the same names and notations as in the schema in 1.2.

    4.2. Give the specific name of the file to open and the different actions that have to be taken in order to run each of the different decisional analyses in your project (only if these differ from what was done during practical work sessions).

    4.3. The user knows how to manipulate the software (Access or BO) and how to connect them. However, you will have to guide him to which query correspond to what analysis, and in each report, which graphic and/or table corresponds to what analysis.

The dossier should contain as many screen captures as necessary (screen captures may be done using ALT+PrintScreen key combination and then using MS Paint to edit the image—for minimising sizes, JPG or

PNG file formats are recommended). Note that text and arrows may be added to an image using PowerPoint or Impress (and pasting the result into Word or Writer).

Constraints

The project has the following constraints:

- Project has to be done in pairs;
- The design report and user guide have to be in one file in pdf format (non-editable format—no .doc, .odt or .docx files);
- All documents (the design report and the user guide) and files, Access databases (.mdb or .accdb files), BO universe and reports have to be handed in before **a date that will be given later on the university Moodle server before 5 PM**. A drop zone will be opened on the server for this purpose (warning, do not wait for the last moment as the server may go down for maintenance after 5 PM).
- A forum will be open on Moodle for questions so that all may see the discussions. **No individual questions will be answered by mail**.

Notes concerning the grades

The **clarity** of the explanations of the report and more specifically of the user guide, **observing** the present **instructions**, will be taken into account when correcting the projects.

Technical notes

Date manipulation functions: some of these functions are available in Microsoft environments. Under Access, they are similar to those of Excel. Among them, one may find:

- *Month(table_name.date_filed_name)* or *Month(a_date)* gives the month of a date;
- *Date()* gives the date of today;
- *Year(table_name.date_field_name)* or *Year(a_date)* gives the year of a date.

In a French version of Microsoft Office, these functions are *Mois*(), *Maintenant*() and *Année*(). Moreover, take extra care when manipulating dates with Microsoft applications as some might use a French (DD/MM/YYYY) representation while others might use an English one (MM/DD/YYYY).

Data dictionary of the data warehouse

Name	Description	Format	Constraints
VATNum	Unique code of a company (Siret)	14 digits (displayed as 3 groups of 3 digits followed by a group of 4 digits--groups are separated by space)	
NameC	Name of a company	40 charatcter string	
TypeC	Type of a company	5 character string	Enumeration (SA, SARL, SCOP, EURL)
GroupC	Company Group Name (owner)	40 charatcter string	
CodeCity	Unique code of a city	5 character string	always 5 digits
NameCity	Name of a city	40 charatcter string	
DepartmentCity	Department code of a city	3 character string	2 digits that may be followed by one character
RegionCity	Region name of a city	40 charatcter string	
CodeEE	Unique code of an employee	Number (Integer)	automatically generated
LastNameEE	Last name of an employee	40 charatcter string	
FirstNameEE	First name of an emplyee	40 charatcter string	
CodeQ	Unique code* of a qualification	Number (Integer)	automatically generated
NameQ	Name of a qualification	40 charatcter string	
LevelQ	Level of a qualification	9 character string	Enumeration (BEP, CAP, BAC PRO, BTS, INGENIEUR)
CodeRW	Unique code of a range of construction works	Number (Integer)	automatically generated
NameRW	Name of a range of construction works	40 charatcter string	Ennumeration (GROS OEUVRE, SECOND OEUVRE, AMENAGEMENT, FINITION / EMBELLISSEMENT, SOL)
CodeS	Unique code of a construction site	Number (Integer)	automatically generated
AddrRoadS	Address (number and road name)of a construction site	40 charatcter string	
PostalCodeS	Postal code of a construction site	5 character string	always 5 digits
CodeTW	Unique code of a type of construction work	Number (Integer)	automatically generated
NameTW	Name of a type of construction work	40 charatcter string	Ennumeration (TERRASSEMENT & VRD, MACONNERIE, ELEMENTS DE STRUCTURE METALLIQUES, METALLERIE, BOIS, COMPOSITE, CLOISENNEMENT, FAUX PLAFOND, REVETEMENT DE SOL, VENTILATION/CLIMATISATION, ELECTRICITE, CHAUDRONNERIE, PLOMBERIE, MENUISERIE, MOBILIER, PLAFONNAGE, PARQUET, PEINTURE, MOQUETTE, SOL SYNTHETIQUE)
HourlyRateCust	Hourly rate charged to the customer	Number (currency format: two digits after decimal point, unit: Euro)	>= 0 AND >= HourlyRateEmployee
HourlyRateEmp	Hourly rate of the employee working on the type of construction work	Number (currency format: two digits after decimal point, unit: Euro)	>= 0
CodeQ	Unique code* of a quotation for construction works	Number (Integer)	automatically generated
DateQ	Date when the quotation is created	Date (format: DD/MM/YYYY)	<= current date
DateEndQ	Date of end of validity of the quotation	Date (format: DD/MM/YYYY)	> DateQ
NbHoursPlanned	Number of hours planned for a type of work in a quotation	Number (real)	>= 0
DateWQ	Date when a type of construction work in a quotation is done	Date (format: DD/MM/YYYY)	<= current date
NBHoursWQ	Number of hours spent on a type of construction work in quotation	Number (real)	>= 0
DateWOQ	Date when a type of construction work out of a quotation is done	Date (format: DD/MM/YYYY)	<= current date
NBHoursWOQ	Number of hours spent on a type of construction work out of a quotation	Number (real)	>= 0
*Warning: there are two CodeQ attributes that correspond to different different attributes.			