**ITD122 Modelling Information Systems**

**Teaching Period three 2019**

**Assignment One – Information Modelling with ORM**

*Individual Work*

*Information System Modelling with ORM Model*

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**Task 1**

**Step 1:**

**(Table 1)**

1)     The PC with PC(.number) Pc01 is stored in the room with Room (.number) 507.

The Worker with name initials ‘EFC’ has access to the PC with PC (.number) Pc01.

Th PC with PC(.number) Pc01 has a Language installed called  Pascal.

Th PC with PC(.number) Pc01 has a Language installed called Prolog.

Th PC with PC(.number) Pc01 has a Language installed called SQL.

The Worker with name initials ‘EFC’ has the Complete name ‘Ed Codfish’.

2)     The PC with PC(.number) Pc01 is stored in the room with Room (.number) 507.

The Worker with name initials ‘TAH’ has access to the PC with PC (.number) Pc01.

Th PC with PC(.number) Pc01 has a Language installed called Pascal.

Th PC with PC(.number) Pc01 has a Language installed called Prolog.

Th PC with PC(.number) Pc01 has a Language installed called SQL.

The Worker with name initials ‘EFC’ has the Complete name ‘Terry Happy’.

3)     The PC with PC(.number) Pc02 is stored in the room with Room (.number) 507.

The Worker with name initials ‘NW’ has access to the PC with PC (.number) Pc02.

Th PC with PC(.number) Pc02 has a Language installed called Pascal.

Th PC with PC(.number) Pc02 has a Language installed called Modula-2

The Worker with name initials ‘NW’ has the Complete name ‘Nancy Wirth’.

4)     The PC with PC(.number) Pc03 is stored in the room with Room (.number) 618.

The Worker with name initials ‘PAB’ has access to the PC with PC (.number) Pc03.

Th PC with PC(.number) Pc03 has a Language installed called Hope.

Th PC with PC(.number) Pc03 has a Language installed called Miranda.

The Worker with name initials ‘PAB’ has the Complete name ‘Paul Boles’.

5)     The PC with PC(.number) Pc03 is stored in the room with Room (.number) 618.

The Worker with name initials ‘JM’ has access to the PC with PC (.number) Pc03.

Th PC with PC(.number) Pc03 has a Language installed called Hope.

Th PC with PC(.number) Pc03 has a Language installed called Miranda.

The Worker with name initials ‘JM’ has the Complete name ‘Joan McCarthy.

6)     The PC with PC(.number) Pc04 is stored in the room with Room (.number) 508.

The Worker with name initials ‘IN’ has access to the PC with PC (.number) Pc04.

Th PC with PC(.number) Pc04 has a Language installed called Hope.

Th PC with PC(.number) Pc04 has a Language installed called Miranda.

The Worker with name initials ‘IN’ has the Complete name ‘Ima Newmie.

7)     The PC with PC(.number) Pc05 is stored in the room with Room (.number) 508.

The Worker with name initials ‘PNC’ has access to the PC with PC (.number) Pc05.

Th PC with PC(.number) Pc05 has a Language installed called COBOL.

Th PC with PC(.number) Pc05 has a Language installed called SQL.

The Languages installed in the PC with PC(.number) Pc05 are COBOL as well as SQL.

The Worker with name initials ‘PNC’ has the Complete name ‘Peter Cruso.

**(Table 2)**

1. The Language with the Language (.Name) COBOL is a Procedural type of Language.

The Worker with the Name initials ‘PNC’ is an expert in the Language with the Language name COBOL.

The Language with the Language (.Name) COBOL is a Procedural type of Language.

The Worker with the Name initials ‘REK’ is an expert in the Language with the Language name COBOL.

The Expert with the name initials ‘REK’ is assigned to a room with Room(.number) 611.

1. The Language with the Language (.Name) HOPE is a Functional type of Language.
2. The Language with the Language (.Name) LISP is a Functional type of Language.

The Worker with the Name initials ‘JM’ is an expert in the Language with the Language name LISP.

The expert with the name initials ‘JM’ is assigned to a room with Room(.number) 618.

1. The Language with the Language (.Name) MODULA-2 is a Procedural type of Language.

The Worker with the Name initials ‘NW’ is an expert in the Language with the Language nameMODULA-2.

The expert with the name initials ‘NW’ is assigned to a room with Room(.number) 507.

1. The Language with the Language (.Name) MIRANDA is a Functional type of Language.

The Worker with the Name initials ‘PAB’ is an expert in the Language with the Language name MIRANDA.

The expert with the name initials ‘PAB’ is assigned to a room with Room(.number) 618.

1. The Language with the Language (.Name) MIRANDA is a Functional type of Language.

The Worker with the Name initials ‘DC’ is an expert in the Language with the Language name MIRANDA.

The expert with the name initials ‘DC’ is assigned to a room with Room(.number) 708.

1. The Language with the Language (.Name) Pascal is a Procedural type of Language.

The Worker with the Name initials ‘NW’ is an expert in the Language with the Language namePascal.

The expert with the name initials ‘NW’ is assigned to a room with Room(.number) 507

1. The Language with the Language (.Name) Pascal is a Procedural type of Language.

The Worker with the Name initials ‘TAH’ is an expert in the Language with the Language name Pascal.

The Expert with the name initials ‘TAH’ is assigned to a room with Room(.number) 507.

10.  The Language with the Language (.Name) Prolog is a Declarative type of Language.

The Worker with the Name initials ‘JS’ is an expert in the Language with the Language name MIRANDA.

The expert with the name initials ‘JS’ is assigned to a room with Room(.number) 407.

1. The Language with the Language (.Name) SQL  is a Declarative type of Language.

The Worker with the Name initials ‘EFC’ is an expert in the Language with the Language name SQL.

The expert with the name initials ‘EFC’ is assigned to a room with Room(.number) 507.

1. The Language with the Language (.Name) SQL  is a Declarative type of Language.

The Worker with the Name initials ‘PNC’ is an expert in the Language with the Language name SQL.

The Expert with the name initials ‘PNC’ is assigned to a room with Room(.number) 508.

1. The Language with the Language (.Name) SQL  is a Declarative type of Language.

The Worker with the Name initials ‘TAH’ is an expert in the Language with the Language name SQL.

The Expert with the name initials ‘TAH’ is assigned to a room with Room(.number) 507.

**(Table 3)**

The language workshop with a declarative type  of language takes 6 hours.

The  worker with the initial ‘JC’ will talk about the Language with the Language Name ‘Prolog’.

The Language with the Language Name ‘Prolog’ is a Declarative Type of Language.

The Language with the Language Name ‘Prolog’ can be discussed in a span of 3 hours

The  worker with the initial ‘PNC’ will talk about the Language with the Language Name ‘SQL’.

The Language with the Language Name ‘SQL’ is a Declarative Type of Language.

The Language with the Language Name ‘SQL’ can be discussed in a span of 1 hour.

The  worker with the initial ‘TAH’ will talk about the Language with the Language Name ‘SQL’.

The Language with the Language Name ‘SQL’ is a Declarative Type of Language.

The Language with the Language Name ‘SQL’ can be discussed in a span of 2 hours

The language workshop with a Functional type of language takes 4 hours.

The  worker with the initial ‘JM’ will talk about the Language with the Language Name ‘LISP’.

The Language with the Language Name ‘LISP’ is a Functional Type of Language.

The Language with the Language Name ‘LISP’ can be discussed in a span of 1 hours

The  worker with the initial ‘PAB’ will talk about the Language with the Language Name ‘Miranda’.

The Language with the Language Name ‘Miranda’ is a Functional Type of Language.

The Language with the Language Name ‘Miranda’ can be discussed in a span of 3 hours

The language workshop with a Procedural type of language takes 6 hours.

The  worker with the initial ‘NW’ will talk about the Language with the Language Name ‘Modula-2’.

The Language with the Language Name ‘Modula-2’ is a Procedural Type of Language.

The Language with the Language Name ‘Modula-2’ can be discussed in a span of 3 hours

The  worker with the initial ‘NW’ will talk about the Language with the Language Name ‘Pascal’.

The Language with the Language Name ‘Pascal’ is a Procedural Type of Language.

The Language with the Language Name ‘Pascal’ can be discussed in a span of 2 hours

The  worker with the initial ‘REK’ will talk about the Language with the Language Name ‘COBOL’.

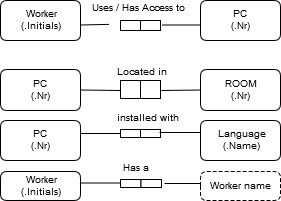
The Language with the Language Name ‘COBOL’ is a Procedural Type of Language.

The Language with the Language Name ‘COBOL’ can be discussed in a span of 1 hour.

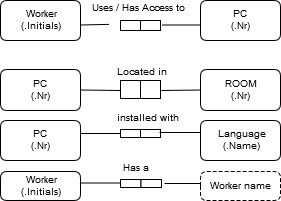
**Step 2:**

Give all fact types and using information base to do population check.

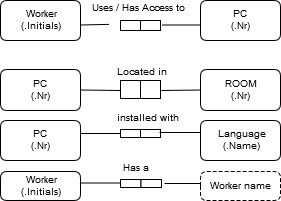
Table 1



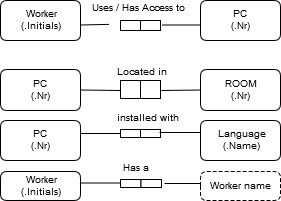
|  |  |
| --- | --- |
| **Worker (.Initials)** | **PC**  **(.Nr)** |
| EFC | PC01 |
| TAH | PC01 |
| NW | PC02 |
| PAB | PC03 |
| JM | PC03 |
| IN | PC04 |
| PNC | PC05 |



|  |  |
| --- | --- |
| **PC**  **(.Nr)** | **Room**  **(.Nr)** |
| PC01 | 507 |
| PC02 | 507 |
| PC03 | 618 |
| PC04 | 508 |
| PC05 | 508 |

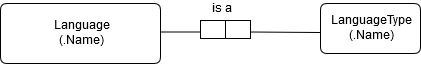


|  |  |
| --- | --- |
| **PC (.Nr)** | **Language**  **(.Name)** |
| PC01 | Pascal |
| PC01 | Prolog |
| PC01 | SQL |
| PC02 | Pascal |
| PC02 | Modula-2 |
| PC03 | Hope |
| PC03 | Miranda |
| PC05 | COBOL |
| PC05 | SQL |



|  |  |
| --- | --- |
| **Worker (.Initials)** | **Worker**  **(.Name)** |
| EFC | Ed Codfish |
| TAH | Terry Happy |
| NW | NancyWirth |
| PAB | Paul Boles |
| JM | Joan McCarthy |
| IN | Ima Newmie |
| PNC | Peter Crusoe |

Table 2



|  |  |
| --- | --- |
| **Language**  **(.Name)** | **Language Type**  **(.Name)** |
| COBOL | Procedural |
| Hope | Functional |
| LISP | Functional |
| Modula-2 | Procedural |
| Miranda | Functional |
| Pascal | Declarative |
| Prolog | Declarative |
| SQL | Declarative |

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|  |  |  |
| --- | --- | --- |
| **Worker**  **(.Initials)** | **Language**  **(.Name)** | **LanguageType**  **(.Name)** |
| PNC | COBOL | Procedural |
| REK | COBOL | Procedural |
|  | HOPE | Functional |
| JM | LISP | Functional |
| NW | Modula-2 | Procedural |
| PAB | Miranda | Functional |
| DC | Miranda | Functional |
| NW | Pascal | Procedural |
| TAH | Pascal | Procedural |
| JS | Prolog | Declarative |
| EFC | SQL | Declarative |
| PNC | SQL | Declarative |
| TAH | SQL | Declarative |

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|  |  |
| --- | --- |
| **Worker**  **(.Initials)** | **Room**  **(.Nr)** |
| PNCE | 508 |
| REK | 611 |
| JM | 618 |
| NW | 507 |
| PAB | 618 |
| DC | 708 |
| NW | 507 |
| TAH | 507 |
| JS | 407 |
| EFC | 507 |
| PNC | 508 |
| TAH | 507 |

Table 3

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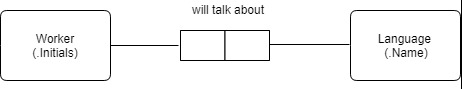
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|  |  |
| --- | --- |
| **Language Type**  **(.Name)** | **Hours** |
| Declarative | 6 |
| Functional | 4 |
| Procedural | 6 |

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|  |  |
| --- | --- |
| **Language**  **(.Name)** | **Hours** |
| Prolog | 3 |
| SQL | 1 |
| SQL | 2 |
| LISP | 1 |
| Miranda | 3 |
| Modula-2 | 3 |
| Pascal | 2 |
| COBOL | 1 |

****

|  |  |
| --- | --- |
| **Worker**  **(.Initials)** | **Language**  **(.Name)** |
| JC | Prolog |
| PNC | SQL |
| TAH | SQL |
| JM | LISP |
| PNB | Miranda |
| NW | Modula-2 |
| NW | Pascal |
| REK | COBOL |

**Step 3:**

 Give the details about the entities that need to be combined and how they are combined. If there are not entities that can be combined, you also need to state clearly this, explain it..…also show the arithmetic derivation…Entities that can be combined and arithmetic derivation.

Based on my observation the entities that needs to be combined are the ones that has only one meaning or representation. These entities are the entities **Worker(.Initials), Worker(.Name).**Furthermore, the entities Worker(.Initials) and Worker(.Name) both ***qualifies as a employee*** of a company so it can be combined to one entity.

On the other hand, Although the entities PC(.Nr), Room(.Nr),Duration(h:), Language(.Name), and Language Type(.Name) has direct relations with each other but I don’t see any reason as to why these entities may be combined due to each may not be group together in one category. Moreover, there are no arithmetic derivation for this situation.

In addition, the entities Language(.Name) and Language Type(.Name) may sound and seem similar but the meaning of each are still different due to Language(.Name) is the computer Language itself such as Prolog, SQL, and Modula2 while the Language Type(.Name) is the kind of like the family type of the Language(.Name).

**Step 4:**

 Uniqueness Constraints… (See the requirements..)

|  |  |
| --- | --- |
| **UNIQUENESS CONSTRAINTS** | **BRIEF EXPLANATION** |
| A close up of a piece of paper  Description automatically generated | The entity with the label ‘Employee(.Name)’ did not show any repetitive worker initials. However, on the entity with the label ‘PC(.Nr)’ showed several repetitive PC number usage.  It showed many-to-one relationship, where the worker with initials ‘EFC’ and ‘TAH’ has access to the PC with PC number ‘PC01’. On the other hand, the workers with initials ‘PAB’ and ‘JM’ has access to the pc with PC number ‘PC03’. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. The entity PC(.Nr) did not show any repetitive information. However the entity Room(.Nr) showed repetitiveness.  It showed many-to-one relationship where the PC with PC (.Nr) 1 & 2 was stated to be located in the same room which was the Room number 507. Moreover, the PC with PC(.Nr) 4 & 5 was located in the same room as well which was the room with Room(.Nr) 508. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. This binary fact type did not show any uniqueness constraint when it came to individual entities. It is shown in the table step 2 that all the PC(.Nr) were repeated. Furthermore, The Languages with the Language(.Name) Pascal and SQL were repeated twice.  However, when the two entities are combined and seen as one, a uniqueness constraint is observed due to there are no combination that is similar to each other. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. Two separate line can be seen to represent that both Worker (.Initials) and Worker(.Name) did not show any repetition. Therefore, each entity shows uniqueness constraint. |
| https://lh3.googleusercontent.com/PcqxEqgb1bIq5573InNQtBhFtroesmO-D3QlxynfkhZZZSUkBBlL0rqvzTb9NmdBXemdDWdktBEYVDRzBmllLEQFtkbVv7_EmtYabzRS2Y_hyaKLJz27lm-S3Ef4qg | The line is presenting that the information is unique. The entity Language (.Name) showed a uniqueness constraint due to there has not been any petition with the Languages mentioned. However, The entity Language Type did not showed any uniqueness constraint due to it represents language types which are only of 3 types.  In addition, the most repeated language Type(.Name) was the Declarative Language Type. |
| A close up of a piece of paper  Description automatically generated | The line is presenting that the information is unique. Initially it can be seen from step 1 that there are repetitive combinations for both entities Employee(.Name) and Room(.Nr). However, this figures may be cancelled.  After the cancellation it showed that the entity Employee(.Name) has a uniqueness constraints.  This Binary fact showed Many-to-one relationship due to different workers are seen to be assigned in the same Room(.Nr). One example to represent this is the E,ployees with Employee(.Name) NW, EFC, and TAH are assigned to room 507. |
| A close up of text on a white surface  Description automatically generated | The line is presenting that the information is unique. The entity Language Type(.Name) has shown a uniqueness constraint. However, it can be seen in the conceptual schema that the values for the entity Duration (:h) has a repetition of the number 6. |
| **https://lh6.googleusercontent.com/v8V5AG_neHqufgBpKyqnfvzdZDjUP2Kdwssv-Ug-uZ9NibXVfNAXTc8A8tq1_6-boPYbDe8c1BTez-ROFfFYYG3gkfUWLl9ZT_91a8dypyeRax1lGydhATPuhnckmg** | The line is presenting that the information is unique. Both entities of this binary fact did not show any uniqueness constraint when observed individually. However, when these two entities are combined and seen as one it illustrates a One-to-Many type of relation.  To further elaborate this, it is due to there are only 3 Language Type(.Name) and several Language(.Name). |
| A picture containing text  Description automatically generated | The line is presenting that the information is unique. Both entities of this binary fact did not show any uniqueness constraint when observed individually. However, when seen as a combination, this binary fact has a uniqueness constraint.  To further elaborate, the entity Language (.Name) has a repetition for the Language ‘SQL’. Moreover, the entity Duration (:h) had several repetitions of hour duration. |
| **A picture containing text  Description automatically generated** | The line is presenting that the information is unique. For each of the binary type presented, it can be observed in the conceptual schema that there were no uniqueness constraint observed individually for each of the entities. However, when these entities for each of the binary type were seen as a combination, a uniqueness constraint was observed.  For the entity Person/ Employee that will talk about the Entity Language(.Name), it can be observed in the conceptual schema model that there was a one-to-many relationship, due to a same employee will talk about two different computer language.  On the other hand, for the entity Employee/Person that is an Expert in the entity Language(.Name), it can be observed in its conceptual schema that there is no uniqueness constraint when each entity is observed individually. However, if these entities are combined there is a uniqueness constraint which is the combination of the entity Worker(.Initials) and the entity Language(.Name). |

**Step 5:**

Mandatory constraints

|  |  |
| --- | --- |
| **MANDATORY CONSTRAINTS** | **BRIEF EXPLANATION** |
|  | Dot is representing that information must be needed. This shows that in the software company, it is stated that each worker must have access to at least one PC. Therefore, we add a dot to indicate that one PC must be accessed / used by at least one worker.  On the other hand, it is not mandatory for a worker to have a mandatory PC(.Nr) assignment. Therefore the dot for the entity Worker(.Initials) is not necessary. |
| A picture containing object  Description automatically generated | Dot is representing that information must be needed. This shows that each PC must have a information as to which room it is kept or located. Therefore, we add a dot to indicate that a PC must be stored in a specific room.  On the other hand, a dot to indicate mandatory constraint for the room is not necessary. |
| A close up of a device  Description automatically generated | There are no mandatory constraint in this binary fact due to it is not required that a PC must have a mandatory installed computer language. This can be seen in the table provided in the assessment instruction where the entity PC with the PC(.Nr) ‘PC4’ does not have a language installed in it. Therefore, there is no need to put a dot in the PC(.Nr) entity or entity Language(.Name) to indicate mandatory constraint. |
| A screenshot of a cell phone  Description automatically generated | Dot is representing that information must be needed. Worker initials are only the abbreviations of a worker’s full name. Therefore, we put a dot to indicate that a worker with a worker(.Initials) must have a complete implication of a worker’s name. |
| A close up of a piece of paper  Description automatically generated | Dot is representing that information must be needed. This shows that a worker is not mandatory to be assigned to a specific room and vice versa. Therefore, we do not put a dot to both entity to represent a mandatory constraint. |
| A close up of a sign  Description automatically generated | Dot is representing that information must be needed. This shows that each Language Type to be discussed equates to a specific total number of time and must be shown how long it will be. Therefore, we put a dot to the entity Duration(:h) to indicate that the entity Language Type must have a total number of Entity hour duration when discussed.  On the other hand, the entity Language Type (.Name) is also required to have a mandatory constraint dot due to it is interconnected with the duration of hours. |
| A close up of a white wall  Description automatically generated | Dot is representing that information must be needed. It can be seen in the situation that a entity Language (.Name) will be discussed by a worker in a specified time. Therefore, we put a dot to the entity hours to indicate that a language being discussed must have a mandatory time duration.  Moreover, since there should be a specified duration of hour long a language type would take it is also necessary to put a dot at the entity language (.name) to indicate that duration is a mandatory constraint. |
|  | Dot is representing that information must be needed. Its can be seen in this binary type that the entities Worker(.Initials) and Worker(.Name) were combined into one entities, this also goes for the entities Language(.Name) and Language Type(.Name). In this situation, only the Worker(.Name) that will talk about a specific Computer Language has a mandatory constraint due to it is not mandatory for a Worker(.Name) to be an expert in a specific language.Therefore, we will only put a dot in the Computer Language entity that is connected to the entity (.Worker) that will talk about the specific language. |

Final Model for Task 1:

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**Task 2**

You need to give all the stepwise details as you did in Task 1 about the new entity/value types you proposed. See the marking criteria for the requirements.

Steps and Final Model for Task 2:You need to show the complete new diagram…This is very important. If no final diagram, we’ll deduct marks. Likewise, if steps are not shown we will deduct mark.

**Step 1:** Firstly, after going through the situations presented in a table format. I did a verbalization of it. This is the process of transforming the table format information to sentences or to simply put it, ***transforming given materials to elementary facts.*** It is also the process where I connect each entity to another entity and seeing if there are any relationship between two entities.

Example:

The PC with PC(.number) Pc01 is stored in the room with Room (.number) 507.

The Worker with name initials ‘EFC’ has access to the PC with PC (.number) Pc01.

Th PC with PC(.number) Pc01 has a Language installed called  Pascal.

Th PC with PC(.number) Pc01 has a Language installed called Prolog.

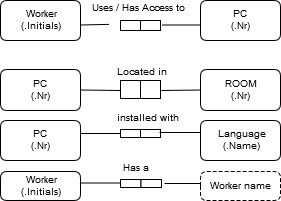
Th PC with PC(.number) Pc01 has a Language installed called SQL.

The Worker with name initials ‘EFC’ has the Complete name ‘Ed Codfish’.

**Step 2**: Secondly, Drawing the facts type and applying population check for the verbalized elementary fact came second in the conceptual modelling process.

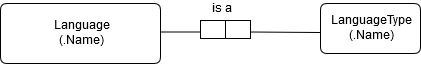
Example:

Table 1



|  |  |
| --- | --- |
| **Worker (.Initials)** | **PC**  **(.Nr)** |
| EFC | PC01 |
| TAH | PC01 |
| NW | PC02 |
| PAB | PC03 |
| JM | PC03 |
| IN | PC04 |
| PNC | PC05 |

Table 2



|  |  |
| --- | --- |
| **Language**  **(.Name)** | **Language Type**  **(.Name)** |
| COBOL | Procedural |
| Hope | Functional |
| LISP | Functional |
| Modula-2 | Procedural |
| Miranda | Functional |
| Pascal | Declarative |
| Prolog | Declarative |
| SQL | Declarative |

Table 3

A close up of text on a white surface

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|  |  |
| --- | --- |
| **Language Type**  **(.Name)** | **Hours** |
| Declarative | 6 |
| Functional | 4 |
| Procedural | 6 |

**Step 3:** The third step for this process would be combining possible entity type constraint that are similar or of the same category and applying arithmetic derivations. In the case for task 1, one the entities called ‘Worker (.Initials)’ and ‘worker (.Name)’ where combined due to these person both represents as a Employee. The new entity names these two was introduced under the entity name ‘**Employee (.Name)’**

**Step 4:** Fourth step for this process is the addition of uniqueness constraints. Uniqueness constraints are lines that are added to represent if there are no repeating information about a entity.

Example:

|  |  |
| --- | --- |
| **UNIQUENESS CONSTRAINTS** | **BRIEF EXPLANATION** |
| A close up of a piece of paper  Description automatically generated | The entity with the label ‘Employee(.Name)’ did not show any repetitive worker initials. However, on the entity with the label ‘PC(.Nr)’ showed several repetitive PC number usage.  It showed many-to-one relationship, where the worker with initials ‘EFC’ and ‘TAH’ has access to the PC with PC number ‘PC01’. On the other hand, the workers with initials ‘PAB’ and ‘JM’ has access to the pc with PC number ‘PC03’. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. The entity PC(.Nr) did not show any repetitive information. However the entity Room(.Nr) showed repetitiveness.  It showed many-to-one relationship where the PC with PC (.Nr) 1 & 2 was stated to be located in the same room which was the Room number 507. Moreover, the PC with PC(.Nr) 4 & 5 was located in the same room as well which was the room with Room(.Nr) 508. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. This binary fact type did not show any uniqueness constraint when it came to individual entities. It is shown in the table step 2 that all the PC(.Nr) were repeated. Furthermore, The Languages with the Language(.Name) Pascal and SQL were repeated twice.  However, when the two entities are combined and seen as one, a uniqueness constraint is observed due to there are no combination that is similar to each other. |
| https://lh5.googleusercontent.com/EdqkLpDebU9E8PfvF7VbLWeKgHfHqeO65tm6QxdYUMT4HJtla36vIkV7oFWEvorl0PfpRx0ONroldkg2zUhrPFG5Neip50is-nc-hXFl74YI6hoe0Zv1TiL50Iq2vA | The line is presenting that the information is unique. Two separate line can be seen to represent that both Worker (.Initials) and Worker(.Name) did not show any repetition. Therefore, each entity shows uniqueness constraint. |

**Step 5:** The final step for this process is the addition of mandatory constraints. ‘purple dots’ are added if an entity has a mandatory role constraint. This means that with the entity either one or both entity may have mandatory role constraints which means either of them requires the other entity.

Example:

|  |  |
| --- | --- |
| **MANDATORY CONSTRAINTS** | **BRIEF EXPLANATION** |
|  | Dot is representing that information must be needed. This shows that in the software company, it is stated that each worker must have access to at least one PC. Therefore, we add a dot to indicate that one PC must be accessed / used by at least one worker.  On the other hand, it is not mandatory for a worker to have a mandatory PC(.Nr) assignment. Therefore the dot for the entity Worker(.Initials) is not necessary. |
| A picture containing object  Description automatically generated | Dot is representing that information must be needed. This shows that each PC must have a information as to which room it is kept or located. Therefore, we add a dot to indicate that a PC must be stored in a specific room.  On the other hand, a dot to indicate mandatory constraint for the room is not necessary. |
| A close up of a device  Description automatically generated | There are no mandatory constraint in this binary fact due to it is not required that a PC must have a mandatory installed computer language. This can be seen in the table provided in the assessment instruction where the entity PC with the PC(.Nr) ‘PC4’ does not have a language installed in it. Therefore, there is no need to put a dot in the PC(.Nr) entity or entity Language(.Name) to indicate mandatory constraint. |
| A screenshot of a cell phone  Description automatically generated | Dot is representing that information must be needed. Worker initials are only the abbreviations of a worker’s full name. Therefore, we put a dot to indicate that a worker with a worker(.Initials) must have a complete implication of a worker’s name. |

**Step 6:**

**A close up of a map

Description automatically generated**

**Task 3**

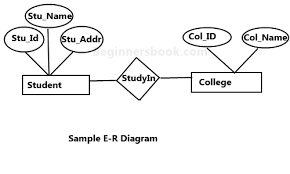
**What is Information System Modelling** ?

One of the most prevalent problems of some institutions is having a quick access to reliable and important information or data that the company uses to make sound planning and important decision making. Without the proper access to the information needed this affects the overall management and work flow of a company which may have a huge impact to their generated income (Love, Zhou, Matthews, Luo, 2016). To lessen the possible risks of loss and miscommunication in a company, information system modelling is used to provide a clear structure of data in a database. A model serves as an architectural plan / blueprint for a system and has detailed plan for the system under construction. According to Love, Zhou, Matthews, Luo, (2016), information System Modelling can be seen as a digital representation of a physical model but focuses mostly on data structure and how information are related and its flow within the system.

Information System Modelling is the process of organizing the flow and understanding the purpose of data inside a Database. The collection of data and facts serves as an information system for a company. However, having data alone may not be efficient enough for a company and may lead to misinterpretation and misunderstanding which results to a costly effect for a company as well as its clients (Halpin, Terry, Morgan, 2008).

To further explain what Information System Modelling is, one example of this is the Entity-Relationship Model which is discussed below:

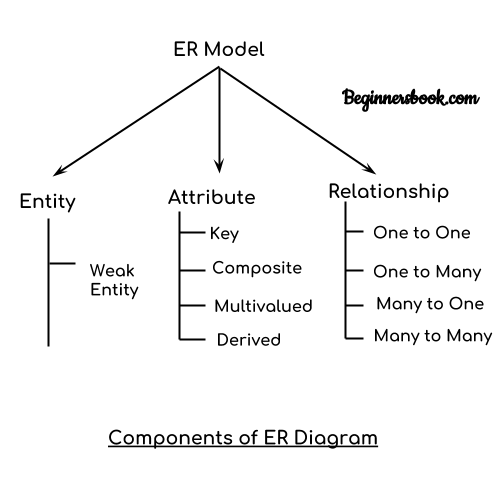
Entity – Relationship Model – According to West (2011) ER model only helps in determining whether the information to be used in building the overall Model for a system that has a specific goal is relevant. Moreover, an ER model has main components called the entity - set and relationship set



Retrieved from: <https://beginnersbook.com/2015/04/e-r-model-in-dbms/>

To further elaborate what the shapes presented in the diagram means and have a clear vision of what it represents, the diagram above shows the entity sets (rectangle shape), Attribute of the entities (ellipses), and the relationship between the two entities (Diamond). In detail, an ‘Entity’ represents the main component of the data, the ‘Attribute’ describes the entities, and The relationship connects two or more entities with each other.

## **Components of a ER Diagram**



Retrieved from: <https://www.researchgate.net/figure/An-ORM-conceptual-schema_fig2_226503029>

**why do we need different modelling techniques?**

In order to achieve and determine a good architecture model design, the designer and client must be able to communicate easily using semantics and must have immediate access to facts (Halpin, Terry, Morgan, 2008) having different modelling techniques allows the different aspects of a proposed system to be considered and seen. Therefore, even though it is said that no model is correct, having several models to test and try its usefulness for the efficiency and correctness helps in building the system database (The importance of Modelling, n.d).

In addition,the process of selecting and applying different modelling techniques are carefully taken in to consideration depending on the goals of the project in able achieve the goals successfully (Hoppenbrouwers, Proper, van der Weide, n.d). Furthermore, According to Hoppenbrouwers, Proper, van der Weide (n.d). one of the goals of an information system modelling technique is to be Communication – Driven**.** During the stage of system development it is important to understand that this allows the flow of creation and dissemination of ideas which we can also refer to knowledge transformation process. Moreover, during the stage of development, system development knowledge is formed to which may also contribute to the improvement of the system to be developed.

B) **What is Conceptual Modelling**?

According to Halpin and Morgan (2008), Conceptual Modelling is a tool that represents a business domain that are easily understood and interpreted by its users due to its relevant concepts. Furthermore, the more the conceptual language can communicate with its user the higher the chance of its purpose to be effective.

In addition, According to Halpin, Terry, Morgan (2008). It is a mental model formed through the used of environmental surroundings, scientific data, and observation. Furthermore, Conceptual Model is seen to be as a representation of an object, process, or system. It is similar to architectural system design. Conceptual Modelling is an essential part of System Modelling due to this method help in clarifying everything between the client and designer. This provides validation which helps in determining whether all data information is relevant, correct, and complete. Moreover, conceptual modelling ensures that the comprehension of data is understandable to all concerned parties.

A final Conceptual Model can be achieved using the 5 steps:

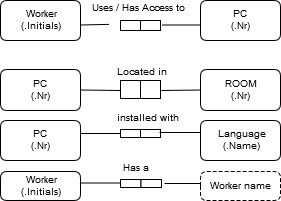
1. Give the elementary facts of given situation.

Example:

The Worker with name initials ‘EFC’ has access to the PC with PC (.number) Pc01.

2) Draw the fact types needed and perform population check.

Example:



|  |  |
| --- | --- |
| **Worker (.Initials)** | **PC**  **(.Nr)** |
| EFC | PC01 |
| TAH | PC01 |
| NW | PC02 |
| PAB | PC03 |
| JM | PC03 |
| IN | PC04 |
| PNC | PC05 |

3) Observe if there are entity types to be combined and perform arithmetic derivation if needed.

Example:

A close up of a piece of paper

Description automatically generated

4) Add uniqueness constraints.

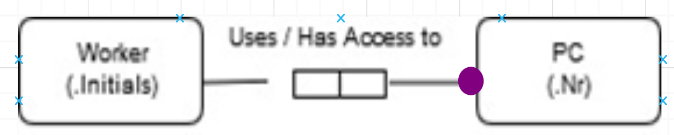
Example:

A close up of a piece of paper

Description automatically generated

5) Add mandatory role constraints.

Example:



**Example of a complete conceptual Schema:**

Example:

A close up of text on a black background

Description automatically generated

**rationale for conceptual model?**

The method of using a conceptual schema is the act of taking information that are necessary for a database and expressing this information in a descriptive language that are understandable to the designers, some of the modelling methods that are used for this are Entity-Relationship Modelling and Objective-Role Modelling (Borgida & Mylopoulous, 2009).

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