**Vanier College**

**Computer Science Department**

**420-320-VA Database I**

**Fall 2018**

**Lab/Assignment Number and Title:**

Exercise 6: Relational Database Model / Normalization

**Submitted by:**

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1. Identification Key:

The Student\_ID is the identification key from the GRADES table.

Functional Dependency:

The Course\_Nb, Semester\_No and Grade are dependent on the Student\_ID.

Full Functional Dependency:

The attribute Grade is fully functional dependent on the Student\_ID and Course\_Nb.

Transitive Dependency:

The Student\_ID determines the Course\_Nb and Semester\_No. Thus, the Course\_Nb and the Semester\_No determine the actual Grade. Finally, the Grade is dependent on the Student\_ID.

1. Functional Dependencies (2nd Normal Form):

* The attribute Description is functionally dependent on the PartNumber.
* The attribute SupplierAddress is functionally dependent on the Supplier.
* The attribute Price is fully functionally dependent on the PartNumber and Supplier.

Tables (2nd Normal Form):

* PartInformation (PartNumber, Description)

|  |  |
| --- | --- |
| **PartNumber** | **Description** |
| 10010 | 20 GB Disk |
| 10220 | 256 MB RAM Card |
| 10440 | 17” LCD Monitor |

* SupplierInformation (Supplier, SupplierAddress)

|  |  |
| --- | --- |
| **Supplier** | **SupplierAddress** |
| Seagate | Cupertino, CA |
| IBM | Armonk, NY |
| Kensington | San Mateo, CA |
| Sun Microsystems | Palo Alto, CA |

* PartOrder (PartNumber, Supplier, Price)

|  |  |  |
| --- | --- | --- |
| **PartNumber** | **Supplier** | **Price** |
| 10010 | Seagate | $100 |
| 10010 | IBM | $90 |
| 10220 | Kensington | $220 |
| 10220 | IBM | $290 |
| 10220 | Sun Microsystems | $310 |
| 10440 | IBM | $2,100 |

There is no need to construct other tables for 3rd Normal Form, since there are no transitive dependencies.

1. Functional Dependencies (2nd Normal Form):

* The attribute TutorEmail is functionally dependent on the TutorID.
* The attributes Course, Room, Book and Date are functionally dependent on the UnitID.
* The attribute Grade is fully functionally dependent on the UnitID, StudentID and TutorID.

Tables (2nd Normal Form):

* TutorInformation (TutorID, TutorEmail)

|  |  |
| --- | --- |
| **TutorID** | **TutorEmail** |
| Tut1 | tut1@fhbb.ch |
| Tut3 | tut3@fhbb.ch |
| Tut5 | Tut3@fhbb.ch |

* UnitInformation (UnitID, Course, Room, Book, Date)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **UnitID** | **Course** | **Room** | **Book** | **Date** |
| U1 | GMT | 629 | Deumlich | 23/02/03 |
| U2 | GIn | 631 | Zehnder | 18/11/02 |
| U4 | AVQ | 621 | SwissTopo | 04/07/03 |
| U5 | PhF | 632 | Lang | 05/05/03 |

* StudentInformation (StudentID, UnitID, TutorID, Grade)

|  |  |  |  |
| --- | --- | --- | --- |
| **StudentID** | **UnitID** | **TutorID** | **Grade** |
| St1 | U1 | Tut1 | 4.7 |
| St1 | U2 | Tut3 | 5.1 |
| St2 | U5 | Tut3 | 4.9 |
| St2 | U4 | Tut5 | 5.0 |
| St4 | U1 | Tut1 | 4.3 |

Functional Dependencies (3rd Normal Form):

* The attribute Course is functionally dependent on the UnitID.
* The attributes Book, Room and Date are functionally dependent on the Course.

Tables (3rd Normal Form):

* UnitInformation (UnitID, Course)

|  |  |
| --- | --- |
| **UnitID** | **Course** |
| U1 | GMT |
| U2 | GIn |
| U4 | AVQ |
| U5 | PhF |

* CourseInformation (Course, Book, Room, Date)

|  |  |  |  |
| --- | --- | --- | --- |
| **Course** | **Book** | **Room** | **Date** |
| GMT | Deumlich | 629 | 23/02/03 |
| GIn | Zehnder | 631 | 18/11/02 |
| AVQ | SwissTopo | 621 | 04/07/03 |
| PhF | Lang | 632 | 05/05/03 |

* TutorInformation (TutorID, TutorEmail)

|  |  |
| --- | --- |
| **TutorID** | **TutorEmail** |
| Tut1 | tut1@fhbb.ch |
| Tut3 | tut3@fhbb.ch |
| Tut5 | Tut3@fhbb.ch |

* StudentInformation (StudentID, UnitID, TutorID, Grade)

|  |  |  |  |
| --- | --- | --- | --- |
| **StudentID** | **UnitID** | **TutorID** | **Grade** |
| St1 | U1 | Tut1 | 4.7 |
| St1 | U2 | Tut3 | 5.1 |
| St2 | U5 | Tut3 | 4.9 |
| St2 | U4 | Tut5 | 5.0 |
| St4 | U1 | Tut1 | 4.3 |

1. The following relation is in 3rd Normal Form, since there is not a single non-key attribute that is transitively dependent on the primary key.
2. The following relation is in 2nd Normal Form, since every non-key attribute is fully functional dependent on the primary key.