

# HW 1 - Normalization

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## Overview

- Assignment points: 10 points or **10%** toward your final grade.
- Due date: **2/5/2023 11:59 pm**.
- Late submission: **2 days** grace period with **20% late penalty**. After that time, assignment will NOT be accepted.
- Submission: submit in Canvas in pdf or word doc.

## Instruction

- Go through below form with all data elements/attributes and organize all attributes to create 3NF design to remove data redundancy and dependency.
- Your un-normalized, 1st and 2nd normal forms will NOT be scrutinized for grading purposes. They are the means to the end (3NF). However, you need to display unnormalized, 1<sup>st</sup> NF, 2<sup>nd</sup> NF and 3<sup>rd</sup> NF, as shown in below sample output.
- Identify each **ENTITY** names by highlighting them in **yellow color** and list each attribute.
- Identify the **Primary Keys** and **Foreign Keys**, if any, and show them within a bracket next to the field name, e.g., **OrderID (PK)**, **ProductID (FK)**, etc.
- If an entity does not change from 1st to 2nd normal form, then simply copy over the data into the 2nd normal form to show that the data is already in second normal form, and so on.
- Your final 3NF should contain all data in the document organized by entity, listing all attributes in each entity with primary and foreign keys, if any.
- Ensure that each attribute is functionally dependent on the primary key for that entity. If an attribute appears multiple times, list it only once in your final normalization design.

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Normalization **Sample** output example:

<b>Tabular form:</b>				
<b>UNNORMALIZED</b>		<b>1st NF</b>	<b>2nd NF</b>	<b>3rd NF</b>
project_code		<b>Project</b>	<b>Project</b>	<b>Project</b>
project_title		project_code	project_code	project_code (PK)
project_manager		project_title	project_title	project_title
project_budget		project_manager	project_manager	project_manager
employee_no		project_budget	project_budget	project_budget
employee_name				
Dept_no		<b>Employee</b>	<b>Proj_Emp</b>	<b>Proj_Emp</b>
Dept_name		project_code	project_code	project_code (FK) } (PK)
Hourly_rate		employee_no	employee_no	employee_no (FK) }
		employee_name	Hourly_rate	Hourly_rate
		Dept_no		
		Dept_name	<b>Employee</b>	<b>Employee</b>
		Hourly_rate	employee_no	employee_no (PK)
			employee_name	employee_name
			Dept_no	Dept_no (FK)
			Dept_name	
				<b>Department</b>
				Dept_no (PK)
				Dept_name

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### INPUT

Please use below form and normalize into 3 NF.

#### School of Computing

CourseNo	123
Course Name	Database
InstructorNo	JF_123
Instructor Name	Jack Fox

StudentNo	Student Name	DOB	Gender	Grade	ProgramNo	Program Name
1	Alex Smith	9/10/1999	F	90	101	CSBS
2	Ravi Grace	1/25/1998	M	95	102	CSEN
3	Tom Ford	2/15/1997	M	80	102	CSEN
4	Lily Mars	3/12/1999	F	85	103	CSBA

#### Assumptions:

This form represents the School of Computing for all the courses it offers - one for each course (e.g., Database) for Student Grade Report. Sample data given for Database course with Lecturer and list of students with their program.

- Each course has only one instructor; Instructor may teach more than one courses.
- Students may register for multiple courses and each course may be taken by several students, i.e., different courses may have different numbers of students.
- Student belongs to only one program (e.g., CSBS).
- Student's grade may be different for different courses.

Sample data are given for illustration purpose only. You just need to use entities/attributes and normalize into 3NF as shown in the sample output given above. If there is no candidate primary key, then create appropriate primary key.