

# Assignment 7

	employee_id	emp_date_created	emp_firstName	emp_lastName	emp_address	emp_phone	emp_username	emp_email	emp_password	emp_type	emp_hourlyWage	emp_salary	organization	department	bank_id
▶	1	2023-02-26 08:04:18	John	Doe	123 Main St	13212412	jdoe	jdoe@email	123asdF1	full_time	NULL	10000.11	1	1	1
	2	2023-02-26 08:04:18	Mary	Ann	178 Kelp St	22765839	mann	mann@email	568aerg0	part_time	16.00	NULL	1	1	2
	3	2023-02-26 08:04:18	Elon	Musk	178 Texas St	22765983	bighwit	musk@email	568aerg0	full_time	NULL	100000.11	1	2	3
	5	2023-02-26 08:17:56	John	Doe	123 Main St	13212412	jdoe23	jdoe@emf34fail	123asdF1	full_time	NULL	10000.11	1	1	NULL
	6	2023-02-26 08:20:09	Harri	Siva	23e23e	3223212	oin23f	noin@fowef	122ff	full_time	NULL	110000.00	1	1	NULL
	7	2023-02-26 08:32:57	Ei	Chapo	US Prison	911	chagito	fuck@des.com	nonono3d2	full_time	NULL	100000.00	5	1	NULL
	8	2023-02-26 20:52:04	Test	Employee	Somewhere in a cave	0	nope	no@pe.com	ad12d	part_time	20.00	NULL	1	2	NULL
	9	2023-02-27 04:35:00	Test2	Employee	pomapomfvfq	123123124	qpm1r12r	apodna@gafqw.com	qwfqwfpm12	full_time	NULL	100000.00	1	1	NULL

We have made employee ID to be the unique identifier (determinant) of the table employee along with other attributes such as employee date created, first name, last name and so on.

Employee(employee\_id, emp\_date\_created, emp\_firstName, emp\_lastName, emp\_address, emp\_phone, emp\_username, emp\_email, emp\_password, emp\_type, emp\_hourlyWage, emp\_salary)

FDs: {employee\_id → emp\_date\_created,  
emp\_username → emp\_email, emp\_password,  
emp\_type → emp\_hourlyWage, emp\_salary}

	bank_id	bnk_date_created	institute_number	transit_number	account_number
▶	1	2023-02-26 08:04:18	001	11242	123123123123
	2	2023-02-26 08:04:18	002	11363	11231442342256
	3	2023-02-26 08:04:18	003	12363	1123144231256

Another table created with bank ID as a primary key, uniquely identifies an employees banking information along with the creation date of the entry.

Bank(bank\_id, bnk\_date\_created, institute\_number, transit\_number, account\_number)  
FDs: { bank\_id → bnk\_date\_created, institute\_number, transit\_number, account\_number}

In the case where we want to add the date the employee got paid for, we can add a new attribute called transaction date to the bank table. But, it will introduce a transitive functional dependency because the transaction date depends on the bank ID attribute, which in turn depends on the employee ID attribute.

To avoid this, we have created a third table called transaction for the relationship between these two tables, that keeps track of the payments made for each employee.

	transaction_id	transaction_date	wage	EI_pay	vacation_pay	bonus_pay	overtime_pay	net_pay	employee_id	bank_id
▶	1	2023-02-16	100.00	0.00	0.00	0.00	NULL	100.00	1	1
	2	2022-01-09	100.00	0.00	0.00	50.00	NULL	150.00	2	2
	8	2023-02-26	12312.00	124.00	421.00	12.00	NULL	412.00	1	1

Here we have used the transaction ID as the primary key, which is a unique identifier for each transaction, and we have also included other attributes such as the net pay.

We have also modified the table to include employee ID and bank ID as foreign keys which will ensure that each transaction is unique to avoid the transitive functional dependency.

Transaction(transaction\_id, transaction\_date, wage, EI\_pay, vacation\_pay, bonus\_pay, overtime\_pay, net\_pay)

## 2) Decomposition to 2NF and 3NF:

1. Organizations (organization\_id, org\_date\_created, org\_name, org\_address, org\_desc, org\_netWorth, payment\_cycle)

	organization_id	org_date_created	org_name	org_address	org_desc	org_netWorth	payment_cycle
▶	1	2023-02-27 00:34:03	AmazonPrime	123 sre st	New Random Desc	1021.65	2023-06-22
	2	2023-02-26 08:04:18	Microsoft	45 erb st	software development company	2554.50	2023-02-20
	3	2023-02-26 08:04:18	Netflix	256 bvl st	internet entertainment services	1200.45	2023-06-18
	4	2023-02-26 08:04:18	Apple	556 brown st	software development company	1054.50	2023-01-06
	5	2023-02-26 08:30:11	DaBouf	Trap	Narcotics	1000000.00	2069-04-20
	6	2023-02-27 04:38:26	Test Organization	423 qwerqoinqwr	New Orgaization	10000.00	2023-06-24

This table is already in 3NF/BCNF because there are no partial dependencies or transitive dependencies.

2. Employee (employee\_id, emp\_date\_created, emp\_firstName, emp\_lastName, emp\_address, emp\_phone, emp\_username, emp\_email, emp\_password, emp\_type, emp\_hourlyWage, emp\_salary, organization, department, bank\_id)

	employee_id	emp_date_created	emp_firstName	emp_lastName	emp_address	emp_phone	emp_username	emp_email	emp_password	emp_type	emp_hourlyWage	emp_salary	organization	department	bank_id
▶	1	2023-02-26 08:04:18	John	Doe	123 Main St	13212412	jdoe	jdoe@email	123asdf1	full_time	10000.11	1	1	1	1
	2	2023-02-26 08:04:18	Mary	Ann	178 Kelp St	22765839	mann	mann@email	568aerg0	part_time	16.00	10000.11	1	1	2
	3	2023-02-26 08:04:18	Elon	Musk	178 Texas St	22765983	bigtwit	musk@email	568aerg0	full_time	10000.11	1	1	2	3
	5	2023-02-26 08:17:56	John	Doe	123 Main St	13212412	jdoe23	jdoe@emf34fail	123asdf1	full_time	10000.11	1	1	1	1
	6	2023-02-26 08:20:09	Harri	Siva	23e23e	3223212	oin23f	noin@fowef	122ff	full_time	110000.00	1	1	1	1
	7	2023-02-26 08:32:57	El	Chapo	US Prison	911	chapito	fuck@dea.com	nonoino3d2	full_time	100000.00	5	1	1	1
	8	2023-02-26 20:52:04	Test	Employee	Somewhere in a cave	0	nope	no@pe.com	ad12d	part_time	20.00	10000.00	1	2	1
	9	2023-02-27 04:35:00	Test2	Employee	pomapomfvfq	123123124	qpm1r12r	apodma@gafqvw	qiwfqwfpn12	full_time	100000.00	1	1	1	1

This table is already in 3NF/BCNF because there are no partial dependencies or transitive dependencies.

3. Department (department\_id, dep\_date\_created, dept\_name, dept\_desc, dept\_budget, organization\_id, manager\_id)

	department_id	dep_date_created	dept_name	dept_desc	dept_budget	organization_id	manager_id
▶	1	2023-02-26 08:04:18	Marketing	Responsible in identifying customer	2000.00	1	1
	2	2023-02-27 00:44:47	Finance	Acquiring and utilizing money for financing	2030.00	1	3
	4	2023-02-26 08:30:30	Supply	Sinolans	10000000.00	5	NULL

This table is already in 3NF/BCNF because there are no partial dependencies or transitive dependencies.

4. Bank (bank\_id, bnk\_date\_created, institute\_number, transit\_number, account\_number)

	bank_id	bnk_date_created	institute_number	transit_number	account_number
▶	1	2023-02-26 08:04:18	001	11242	123123123123
	2	2023-02-26 08:04:18	002	11363	11231442342256
	3	2023-02-26 08:04:18	003	12363	1123144231256

This table is already in 3NF/BCNF because there are no partial dependencies or transitive dependencies.

5. Transactions (transaction\_id, transaction\_date, wage, EI\_pay, vacation\_pay, bonus\_pay, overtime\_pay, net\_pay, employee\_id, bank\_id)

	transaction_id	transaction_date	wage	EI_pay	vacation_pay	bonus_pay	overtime_pay	net_pay	employee_id	bank_id
▶	1	2023-02-16	100.00	0.00	0.00	0.00	NULL	100.00	1	1
	2	2022-01-09	100.00	0.00	0.00	50.00	NULL	150.00	2	2
	8	2023-02-26	12312.00	124.00	421.00	12.00	NULL	412.00	1	1

This table has a partial dependency of {transaction\_id, transaction\_date} on {wage, EI\_pay, vacation\_pay, bonus\_pay, overtime\_pay, net\_pay}, because the wage and pay columns are functionally dependent on the transaction\_id and transaction\_date.

To decompose this table to 2NF, create two tables:

**Transactions1** (transaction\_id, transaction\_date, net\_pay)

**Transactions2** (transaction\_id, transaction\_date, wage, EI\_pay, vacation\_pay, bonus\_pay, overtime\_pay)

Table Transactions1 is in 2NF and Transactions2 is in 3NF.

Transactions1 has the primary compound key of (transaction\_id, transaction\_date) because transaction\_id and transaction\_date functionally determine the net\_pay column.

Transactions2 has the primary compound key of (transaction\_id, transaction\_date) because the combination of transaction\_id and transaction\_date functionally determines the other columns (wage, EI\_pay, vacation\_pay, bonus\_pay, and overtime\_pay).

6. Performance (performance\_id, perf\_date\_created, perf\_notes, date\_Achieved, KPI\_Achieved)

	performance_id	perf_date_created	perf_notes	date_Achieved	KPI_Achieved	appraiser_id	appraised_id	project_id
▶	27	2023-02-27 03:45:04	completed	2022-04-20	50	1	2	3
*	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

This table has a transitive dependency of {performance\_id} on {date\_Achieved, KPI\_Achieved}, because date\_Achieved and KPI\_Achieved are functionally dependent on performance\_id through the perf\_notes column.

To decompose this table to 3NF, create two tables:

**Performance1** (performance\_id, perf\_date\_created, perf\_notes)

**Performance2** (performance\_id, date\_Achieved, KPI\_Achieved)

Both tables are in 3NF/BCNF.

Overall, all the tables are now in 3NF/BCNF.

Performance1 has the primary key of performance\_id because it functionally determines the other columns.

Performance2 has the primary key of performance\_id because it functionally determines the date\_Achieved and KPI\_Achieved columns.