LAPORAN PRAKTIKUM
MATA KULIAH PRAKTIKUM BASIS DATA

Dosen Pengampu : Farid Angga Pribadi, S.Kom., M.Kom.

PERTEMUAN 8 : NORMALISASI

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JURUSAN TEKNOLOGI INFORMASI
POLITEKNIK NEGERI MALANG
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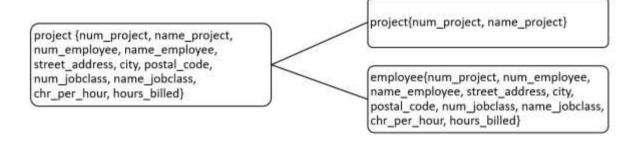## Langkah – Langkah Praktikum

Langkah 1 :

1) Bukalah berkas spreadsheet bernama **'DataSoftwareHouseAustria.XLSX'** yang dilampirkan bersama jobsheet ini.
2) File tersebut berisi data pegawai software house di Austria beserta atribut lain yang mendukung project yang dikerjakan di perusahaan tersebut.
3) Teliti setiap atribut yang tertulis pada data tersebut dan amati ketidak sesuaian atribut yang ada sehingga mempersulit proses insert, update, delete dan modifikasi.
4) Pertimbangkan pula bagaimana bentuk yang baik dan sesuai dengan aturan normalisasi yang efisien.

num_project	name_project	num_employee	name_employee	street_address	city	postal_code	num_jobclass	name_jobclass	chr_per_hour	hours_billed
15	Evergreen	103	June E. Arbrough	Pazmaniteng 24-9	Vienna	A-1020	E01	Elec. Engineering	€84,50	23,8
		101	John G. News	Weihbunggasse 26	Vienna	A-1020	E02	Database Designer	€105,00	19,4
		105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€105,00	35,7
		106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€35,75	12,6
		102	David H. Senior	Wiener Hauptstraße 10/A/4/15	Wien	A-1014	E04	System Analyst	€96,75	23,8
18	Amber Wave	114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€48,10	24,6
		118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€18,36	45,3
		104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€96,75	32,4
		112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€45,95	44
22	Einsten	105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€105,00	64,7
		104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€96,75	48,4
		113	Delbert K. Joenbrood	Liebiggasse 3/1/10	Wien	A-1014	E05	Application Designer	€48,10	23,6
		111	Geoff B. Wabash	Krakaudorf 32	Krakaudorf	A-8854	E08	Clerical Support	€26,87	22
		106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€35,75	12,8
25	Phoenix	107	Maria D. Alonzo	Krakaudorf 11	Krakaudorf	A-8854	E03	Programmer	€35,75	24,6
		115	Travis B. Bawangi	Liebiggasse 3/1/10	Wien	A-1014	E04	System Analyst	€96,75	45,8
		101	John G. News	Weihbunggasse 26	Vienna	A-1020	E02	Database Designer	€105,00	56,3
		114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€48,10	33,1
		108	Ralph B. Washington	Krakaudorf 22	Krakaudorf	A-8854	E04	System Analyst	€96,75	23,6
		118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€18,36	30,5
		112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€45,95	41,4

Langkah 2 :

1. Normalisasi data sesuai bentuk normal kesatu karena data pada langkah 1 tidak memenuhi bentuk normal data bagian satu (1NF). Maka akan menghasilkan dekomposisi tabel sebagai berikut :

num_project	name_project	num_employee	name_employee	street_address	city	postal_code	num_jobclass	name_jobclass	chr_per_hour	hours_billed
15	Evergreen	103	June E. Arbough	Pazmaniteng 24-9	Vienna	A-1020	E01	Elec. Engineering	€84,50	23,8
15	Evergreen	101	John G. News	Weihburggasse 26	Vienna	A-1020	E02	Database Designer	€105,00	19,4
15	Evergreen	105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€105,00	35,7
15	Evergreen	106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€35,75	12,6
15	Evergreen	102	David H. Senior	Wiener Hauptstraße 10/4/4/15	Wien	A-1014	E04	System Analyst	€96,75	23,8
18	Amber Wave	114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€48,10	24,6
18	Amber Wave	118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€18,36	45,3
18	Amber Wave	104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€96,75	32,4
18	Amber Wave	112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€45,95	44
22	Einstein	105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€105,00	64,7
22	Einstein	104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€96,75	48,4
22	Einstein	113	Delbert K. Joenbrood	Liebiggasse 3/1/10	Wien	A-1014	E05	Application Designer	€48,10	23,6
22	Einstein	111	Geoff B. Wabash	Krakaudorf 32	Krakaudorf	A-8854	E08	Clerical Support	€26,87	22
22	Einstein	106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€35,75	12,8
25	Phoenix	107	Maria D. Alonzo	Krakaudorf 11	Krakaudorf	A-8854	E03	Programmer	€35,75	24,6
25	Phoenix	115	Travis B. Bawangi	Liebiggasse 3/1/10	Wien	A-1014	E04	System Analyst	€96,75	45,8
25	Phoenix	101	John G. News	Weihburggasse 26	Vienna	A-1020	E02	Database Designer	€105,00	56,3
25	Phoenix	114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€48,10	33,1
25	Phoenix	108	Ralph B. Washington	Krakaudorf 22	Krakaudorf	A-8854	E04	System Analyst	€96,75	23,6
25	Phoenix	118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€18,36	30,5
25	Phoenix	112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€45,95	41,4

project {num_project, name_project, num_employee, name_employee, street_address, city, postal_code, num_jobclass, name_jobclass, chr_per_hour, hours_billed}

project{num_project, name_project}

employee{num_project, num_employee, name_employee, street_address, city, postal_code, num_jobclass, name_jobclass, chr_per_hour, hours_billed}

2. Lakukan pengecekan (*Lossless–Join Decomposition*) pada tabel baru hasil dekomposisi tersebut! <SOAL>

➔ Berikut adalah hasil pengecekan *Loseless Join Decompocition* pada tabel baru hasil dekomposisi :

INF

num_project	name_project	num_employee	name_employee	street_address	city	postal_code	num_jobclass	name_jobclass	chr_per_hour	hours_billed
15	Evergreen	103	June E. Arbough	Pazmaniteng 24-9	Vienna	A-1020	E01	Elec. Engineering	€ 84,50	23,8
15	Evergreen	101	John G. News	Weihburggasse 26	Vienna	A-1020	E02	Database Designer	€ 105,00	19,4
15	Evergreen	105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€ 105,00	35,7
15	Evergreen	106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€ 35,75	12,6
15	Evergreen	102	David H. Senior	Wiener Hauptstraße 10	Wien	A-1014	E04	System Analyst	€ 96,75	23,8
18	Amber Wave	114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€ 48,10	24,6
18	Amber Wave	118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€ 18,36	45,3
18	Amber Wave	104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€ 96,75	32,4
18	Amber Wave	112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€ 45,95	44
22	Einsten	105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020	E02	Database Designer	€ 105,00	64,7
22	Einsten	104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020	E04	System Analyst	€ 96,75	48,4
22	Einsten	113	Delbert K. Joenbrood	Liebiggasse 3/1/10	Wien	A-1014	E05	Application Designer	€ 48,10	23,6
22	Einsten	111	Geoff B. Wabash	Krakaudorf 32	Krakaudorf	A-8854	E08	Clerical Support	€ 26,87	22
22	Einsten	106	William Smithfield	Gartenweg 8	Rafing	A-1010	E03	Programmer	€ 35,75	12,8
25	Phoenix	107	Maria D. Alonzo	Krakaudorf 11	Krakaudorf	A-8854	E03	Programmer	€ 35,75	24,6
25	Phoenix	115	Travis B. Bawangi	Liebiggasse 3/1/10	Wien	A-1014	E04	System Analyst	€ 96,75	45,8
25	Phoenix	101	John G. News	Weihburggasse 26	Vienna	A-1020	E02	Database Designer	€ 105,00	56,3
25	Phoenix	114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020	E05	Application Designer	€ 48,10	33,1
25	Phoenix	108	Ralph B. Washington	Krakaudorf 22	Krakaudorf	A-8854	E04	System Analyst	€ 96,75	23,6
25	Phoenix	118	James J. Frommer	Gartenweg 20	Rafing	A-1010	E06	General Support	€ 18,36	30,5
25	Phoenix	112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014	E07	DSS Analyst	€ 45,95	41,4

3. **Langkah 3**

   1) Pengecekan FD pada tabel hasil langkah 2 akan menghasilkan data FD sebagai berikut :

   Pada tabel project

   num_project → name_project

   Pada tabel employee
   - {num_project, num_employee, num_jobclass} → name_employee
   - {num_project, num_employee, num_jobclass} → street_address
   - {num_project, num_employee, num_jobclass} → city
   - {num_project, num_employee, num_jobclass} → postal_code
   - {num_project, num_employee, num_jobclass} → name_jobclass
   - {num_project, num_employee, num_jobclass} → chr_per_hour
   - {num_project, num_employee, num_jobclass} → hours_billed

   FD
   num_project → name_project
   no_employee → {name_employee, street_address, city, postal_code}
   no_jobclass → {name_jobclass, chr_per_hours}
   {num_project, num_employee, num_jobclass} → hours_billed

   2) Normalisasi tabel menjadi bentuk 2NF. Berdasarkan informasi FD maka dekomposisi tabel yang semula 2 tabel menjadi 4 tabel sebagai berikut :
   - project{num_project, name_project}
   - employee{no_employee, name_employee, street_address, city, postal_code}
   - jobclass{no_jobclass, name_jobclass, chr_per_hours}
   - hours{ num_project, num_employee, num_jobclass, hours_billed}

   3) Lakukan pengecekan (*Lossless–Join Decomposition*) dan (*dependency preservation*) pada tabel baru hasil dekomposisi tersebut! **<SOAL>**

   ➔ **2NF**

   ➢ Tabel Project

Num_Project	name_project
15	Evergreen
18	Amber Wave
22	Einsten
25	Phoenix

➢ Tabel Employee

num_employee	name_employee	street_address	city	postal_code
103	June E. Arbough	Pazmaniteng 24-9	Vienna	A-1020
101	John G. News	Weihburggasse 26	Vienna	A-1020
105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020
106	William Smithfield	Gartenweg 8	Rafing	A-1010
102	David H. Senior	Wiener Hauptstraße 10/A/4/1	Wien	A-1014
114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020
118	James J. Frommer	Gartenweg 20	Rafing	A-1010
104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020
112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014
105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020
104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020
113	Delbert K. Joenbrood	Liebiggasse 3/1/10	Wien	A-1014
111	Geoff B. Wabash	Krakaudorf 32	Krakaudorf	A-8854
106	William Smithfield	Gartenweg 8	Rafing	A-1010
107	Maria D. Alonzo	Krakaudorf 11	Krakaudorf	A-8854
115	Travis B. Bawangi	Liebiggasse 3/1/10	Wien	A-1014
101	John G. News	Weihburggasse 26	Vienna	A-1020
114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020
108	Ralph B. Washington	Krakaudorf 22	Krakaudorf	A-8854
118	James J. Frommer	Gartenweg 20	Rafing	A-1010
112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014

➢ Tabel Joblass

num_jobclass	name_jobclass	chr_per_hour
E01	Elec. Engineering	€ 84,50
E02	Database Designer	€ 105,00
E02	Database Designer	€ 105,00
E03	Programmer	€ 35,75
E04	System Analyst	€ 96,75
E05	Application Desiger	€ 48,10
E06	General Support	€ 18,36
E04	System Analyst	€ 96,75
E07	DSS Analyst	€ 45,95
E02	Database Designer	€ 105,00
E04	System Analyst	€ 96,75
E05	Application Desiger	€ 48,10
E08	Clerical Support	€ 26,87
E03	Programmer	€ 35,75
E03	Programmer	€ 35,75
E04	System Analyst	€ 96,75
E02	Database Designer	€ 105,00
E05	Application Desiger	€ 48,10
E04	System Analyst	€ 96,75
E06	General Support	€ 18,36
E07	DSS Analyst	€ 45,95

➢ Tabel Hours

num_project	num_employee	num_jobclass	hours_billled
15	103	E01	23,8
15	101	E02	19,4
15	105	E02	35,7
15	106	E03	12,6
15	102	E04	23,8
18	114	E05	24,6
18	118	E06	45,3
18	104	E04	32,4
18	112	E07	44
22	105	E02	64,7
22	104	E04	48,4
22	113	E05	23,6
22	111	E08	22
22	106	E03	12,8
25	107	E03	24,6
25	115	E04	45,8
25	101	E02	56,3
25	114	E05	33,1
25	108	E04	23,6
25	118	E06	30,5
25	112	E07	41,4

Langkah 4 :

1) Mencari hubungan syarat 3NF dengan mempertimbangkan X → A sesuai dengan ketentuan 3NF

   Terdapat beberapa non key yang memiliki ketergantungan dengan non key lain, sesuai FD baru sebagai berikut :

   - {city, street_address} → postal_code dimana X adalah superkey
   - name_project → {name_employee, name_jobclass} dimana X adalah superkey
   - {name_employee, name_jobclass} → chr_per_hours dimana dimana X adalah superkey

2) Berdasarkan FD tersebut maka tabel pada langkah 3 diperbaharui dekomposisinya menjadi :

   - project{<u>num_project</u>, name_project}
   - employee{<u>no_employee</u>, name_employee, street_address }
   - jobclass{<u>no_jobclass</u>, name_jobclass, chr_per_hours}
   - hours{ <u>num_project</u>, <u>num_employee</u>,<u>num_jobclass</u>, hours_billed}
   - **address{<u>city</u>, <u>street_address</u>, postal_code}**
   - **jobclass_detail{<u>name_project</u>, name_employee, name_jobclass}**
   - **charge{<u>name_employee</u>, <u>name_jobclass</u>, chr_per_hours}**

3) Lakukan pengecekan (*Lossless–Join Decomposition*) dan (*dependency preservation*) pada tabel baru hasil dekomposisi tersebut! **<SOAL>**

   → **3NF**

   ➢ Tabel Project

num_project	name_project
15	Evergreen
18	Amber Wave
22	Einsten
25	Phoenix

   ➢ Tabel Employee

num_employee	name_employee	street_address	city	postal_code
103	June E. Arbough	Pazmaniteng 24-9	Vienna	A-1020
101	John G. News	Weihburggasse 26	Vienna	A-1020
105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020
106	William Smithfield	Gartenweg 8	Rafing	A-1010
102	David H. Senior	Wiener Hauptstraße 10/A/4/1	Wien	A-1014
114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020
118	James J. Frommer	Gartenweg 20	Rafing	A-1010
104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020
112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014
105	Alice K. Johnson	Pazmaniteng 25-19	Vienna	A-1020
104	Anne K. Ramoras	Sterzinger Straße 1	Innsbruck	A-6020
113	Delbert K. Joenbrood	Liebiggasse 3/1/10	Wien	A-1014
111	Geoff B. Wabash	Krakaudorf 32	Krakaudorf	A-8854
106	William Smithfield	Gartenweg 8	Rafing	A-1010
107	Maria D. Alonzo	Krakaudorf 11	Krakaudorf	A-8854
115	Travis B. Bawangi	Liebiggasse 3/1/10	Wien	A-1014
101	John G. News	Weihburggasse 26	Vienna	A-1020
114	Annelise Jones	Pazmaniteng 1-1	Vienna	A-1020
108	Ralph B. Washington	Krakaudorf 22	Krakaudorf	A-8854
118	James J. Frommer	Gartenweg 20	Rafing	A-1010
112	Darlene M. Smithson	Liebiggasse 5/1/5	Wien	A-1014

➢ Tabel Jobclass

num_jobclass	name_jobclass	chr_per_hour
E01	Elec. Engineering	€ 84,50
E02	Database Designer	€ 105,00
E02	Database Designer	€ 105,00
E03	Programmer	€ 35,75
E04	System Analyst	€ 96,75
E05	Application Desiger	€ 48,10
E06	General Support	€ 18,36
E04	System Analyst	€ 96,75
E07	DSS Analyst	€ 45,95
E02	Database Designer	€ 105,00
E04	System Analyst	€ 96,75
E05	Application Desiger	€ 48,10
E08	Clerical Support	€ 26,87
E03	Programmer	€ 35,75
E03	Programmer	€ 35,75
E04	System Analyst	€ 96,75
E02	Database Designer	€ 105,00
E05	Application Desiger	€ 48,10
E04	System Analyst	€ 96,75
E06	General Support	€ 18,36
E07	DSS Analyst	€ 45,95

➢ Tabel Hours

num_project	num_employee	num_jobclass	hours_billled
15	103	E01	23,8
15	101	E02	19,4
15	105	E02	35,7
15	106	E03	12,6
15	102	E04	23,8
18	114	E05	24,6
18	118	E06	45,3
18	104	E04	32,4
18	112	E07	44
22	105	E02	64,7
22	104	E04	48,4
22	113	E05	23,6
22	111	E08	22
22	106	E03	12,8
25	107	E03	24,6
25	115	E04	45,8
25	101	E02	56,3
25	114	E05	33,1
25	108	E04	23,6
25	118	E06	30,5
25	112	E07	41,4

➢ Tabel Address

street_address	city	postal_code
Pazmaniteng 24-9	Vienna	A-1020
Weihburggasse 26	Vienna	A-1020
Pazmaniteng 25-19	Vienna	A-1020
Gartenweg 8	Rafing	A-1010
Wiener Hauptstraße 10/A/4/15	Wien	A-1014
Pazmaniteng 1-1	Vienna	A-1020
Gartenweg 20	Rafing	A-1010
Sterzinger Straße 1	Innsbruck	A-6020
Liebiggasse 5/1/5	Wien	A-1014
Pazmaniteng 25-19	Vienna	A-1020
Sterzinger Straße 1	Innsbruck	A-6020
Liebiggasse 3/1/10	Wien	A-1014
Krakaudorf 32	Krakaudorf	A-8854
Krakaudorf 11	Krakaudorf	A-8854
Liebiggasse 3/1/10	Wien	A-1014
Pazmaniteng 1-1	Vienna	A-1020
Krakaudorf 22	Krakaudorf	A-8854
Gartenweg 20	Rafing	A-1010
Liebiggasse 5/1/5	Wien	A-1014

➢ Tabel Jobclass_detail

name_project	name_employee	name_jobclass
Evergreen	June E. Arbough	Elec. Engineering
Evergreen	John G. News	Database Designer
Evergreen	Alice K. Johnson	Database Designer
Evergreen	William Smithfield	Programmer
Evergreen	David H. Senior	System Analyst
Amber Wave	Annelise Jones	Application Desiger
Amber Wave	James J. Frommer	General Support
Amber Wave	Anne K. Ramoras	System Analyst
Amber Wave	Darlene M. Smithson	DSS Analyst
Einsten	Alice K. Johnson	Database Designer
Einsten	Anne K. Ramoras	System Analyst
Einsten	Delbert K. Joenbrood	Application Desiger
Einsten	Geoff B. Wabash	Clerical Support
Einsten	William Smithfield	Programmer
Phoenix	Maria D. Alonzo	Programmer
Phoenix	Travis B. Bawangi	System Analyst
Phoenix	John G. News	Database Designer
Phoenix	Annelise Jones	Application Desiger
Phoenix	Ralph B. Washington	System Analyst

➢ Tabel Charge

name_employee	name_jobclass	chr_per_hour
June E. Arbough	Elec. Engineering	€84,50
John G. News	Database Designer	€105,00
Alice K. Johnson	Database Designer	€105,00
William Smithfield	Programmer	€35,75
David H. Senior	System Analyst	€96,75
Annelise Jones	Application Desiger	€48,10
James J. Frommer	General Support	€18,36
Anne K. Ramoras	System Analyst	€96,75
Darlene M. Smithson	DSS Analyst	€45,95
Alice K. Johnson	Database Designer	€105,00
Anne K. Ramoras	System Analyst	€96,75
Delbert K. Joenbrood	Application Desiger	€48,10
Geoff B. Wabash	Clerical Support	€26,87
William Smithfield	Programmer	€35,75
Maria D. Alonzo	Programmer	€35,75
Travis B. Bawangi	System Analyst	€96,75
John G. News	Database Designer	€105,00
Annelise Jones	Application Desiger	€48,10
Ralph B. Washington	System Analyst	€96,75
James J. Frommer	General Support	€18,36
Darlene M. Smithson	DSS Analyst	€45,95

TUGAS

1. Jawablah **<SOAL>** dengan terlebih dahulu melakukan langkah-langkah kegiatan diatas!

2. Lakukan normalisasi sesuai dengan langkah-langkah percobaan diatas sekaligus lakukan pengecekan mulai bentuk 1NF sampai dengan 3NF yang sesuai dengan 3 kriteria bentuk normal yang baik pada studi kasus di bawah ini!

   Sebuah data peminjaman perpustakaan di Politeknik Negeri Balikpapan berikut memiliki keistimewaan pada jumlah hari peminjaman buku. Semakin lama jumlah hari peminjaman diartikan semakin banyak jumlah halaman buku yang dipinjam.

No. Trans.	No.Anggota	Nama	Status	Kode Buku	Judul	Pengarang	Penerbit	ISBN	Jml	TglPinjam	TglKembali	JmlHari
12001	A-001	Budi	Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	10-12-2016	15-12-2016	5
12001	A-001	Budi	Tetap	B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0	1	10-12-2016	15-12-2016	5
12001	A-001	Budi	Tetap	B-003	Foxpro	Andrea	Andi	978-979-8340-17-8	1	10-12-2016	15-12-2016	5
12002	A-002	Aulia	Tidak Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	11-12-2016	14-12-2016	3
12002	A-002	Aulia	Tidak Tetap	B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0	1	11-12-2016	14-12-2016	3
12003	A-003	Susan	Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	12-12-2016	17-12-2016	5
12003	A-003	Susan	Tetap	B-004	Pascal	Abdul	Modula	978-979-692-046-4	1	12-12-2016	17-12-2016	5

3. Lakukan normalisasi pada studi kasus di bawah ini mulai bentuk 1NF sampai dengan 3NF, sekaligus lakukan pengecekan yang sesuai dengan 3 kriteria bentuk normal yang baik! (Bentuk normalisasi tidak dibatasi, silahkan disesuaikan dengan kondisi studi kasus)

   ➔ Jawab :

   - **1NF**
     ➢ Normalisasi data sesuai bentuk normal kesatu karena data pada Langkah 1 tidak memenuhi bentuk normal data bagian satu (1NF). Maka akan menghasilkan dekomposisi tabel sebagai berikut :

No. Trans.	No.Anggota	Nama	Status	KodeBuku	Judul	Pengarang	Penerbit	ISBN	Jml	TglPinjam	TglKembali	JmlHari
12001	A-001	Budi	Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	10-12-2016	15-12-2016	5
12001	A-001	Budi	Tatap	B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0	1	10-12-2016	15-12-2016	5
12001	A-001	Budi	Tetap	B-003	Foxpro	Nadrea	Andi	978-979-8340-17-8	1	10-12-2016	15-12-2016	5
12002	A-002	Aulia	Tidak Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	11-12-2016	14-12-2016	3
12002	A-002	Aulia	Tidak Tetap	B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0	1	11-12-2016	14-12-2016	3
12003	A-003	Susan	Tetap	B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2	1	12-12-2016	17-12-2016	5
12003	A-003	Susan	Tetap	B-004	Pascal	Abdul	Modula	978-979-692-046-4	1	12-12-2016	17-12-2016	5

     1. Peimary key : no trans
     2. Atribut : no anggota, nama, status, kode buku, judul, pengarang, penerbit, ISBN, jml, tgl pinjam, tgl Kembali, jml hari

- **2NF**
  1. Tabwl Transaksi

No. Trans.	No.Anggota	KodeBuku	Jml	TglPinjam	TglKembali	JmlHari
12001	A-001	B-001	1	10-12-2016	15-12-2016	5
12001	A-001	B-002	1	10-12-2016	15-12-2016	5
12001	A-001	B-003	1	10-12-2016	15-12-2016	5
12002	A-002	B-001	1	11-12-2016	14-12-2016	3
12002	A-002	B-002	1	11-12-2016	14-12-2016	3
12003	A-003	B-001	1	12-12-2016	17-12-2016	5
12003	A-003	B-004	1	12-12-2016	17-12-2016	5

  2. Tabel Buku

KodeBuku	Judul	Pengarang	Penerbit	ISBN
B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2
B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0
B-003	Foxpro	Nadrea	Andi	978-979-8340-17-8
B-004	Pascal	Abdul	Modula	978-979-692-046-4

  3. Tabel Anggota

No.Anggota	Nama	Status
A-001	Budi	Tetap
A-002	Aulia	Tidak Tetap
A-003	Susan	Tetap

- **3NF**
  1. Tabel Anggota

No.Anggota	Nama	Status
A-001	Budi	Tetap
A-002	Aulia	Tidak Tetap
A-003	Susan	Tetap

  2. Tabel Buku

KodeBuku	Judul	Pengarang	Penerbit	ISBN
B-001	Delphi	Antoni	Informatika Bandung	978-979-769-513-2
B-002	Visual Basic	Joni	Erlangga	978-979-518-852-0
B-003	Foxpro	Nadrea	Andi	978-979-8340-17-8
B-004	Pascal	Abdul	Modula	978-979-692-046-4

3. Tabel Transaksi

No. Trans.	Jml	TglPinjam	TglKembali	JmlHari
12001	1	10-12-2016	15-12-2016	5
12002	1	11-12-2016	14-12-2016	3
12003	1	12-12-2016	17-12-2016	5

4. Tabel Detail Transaksi

No Detail Transak	No. Trans.	No.Anggota	KodeBuku
DT-001	12001	A-001	B-001
DT-002	12001	A-001	B-002
DT-003	12001	A-001	B-003
DT-004	12002	A-002	B-001
DT-005	12002	A-002	B-002
DT-006	12003	A-003	B-001
DT-007	12003	A-003	B-004

Indonesia Air memiliki data penerbangan domestik yang rutin dilaksanakan dalam periode tertentu.

PESONA PENERBANGAN INDONESIA

No	FROM	TO	FLIGHT NO.	ETA	ETD	DAY OF SERVICES	FLEET	REMARKS
1	BANDUNG	PADANG	I8 6420	06:00	07:40	DAILY	A320	DIRECT
		PALEMBANG	I8 6440	10:10	11:20	DAILY	A320	DIRECT
		MEDAN	I8 6440	10:10	13:20	DAILY	A320	VIA PALEMBANG
		PEKANBARU	I8 6450	17:30	19:10	DAILY	A320	DIRECT
2	MEDAN	PALEMBANG	I8 6441	13:50	15:30	DAILY	A320	DIRECT
		BANDUNG	I8 6441	13:50	17:05	DAILY	A320	VIA PALEMBANG
3	PADANG	BANDUNG	I8 6251	08:05	09:45	DAILY	A320	DIRECT
4	PEKAN BARU	BANDUNG	I8 6451	19:35	21:15	DAILY	A320	DIRECT
5	PALEMBANG	BANDUNG	I8 6441	15:55	17:05	DAILY	A320	DIRECT
		MEDAN	I8 6440	11:45	13:02	DAILY	A320	DIRECT
6	PONTIANAK	SINTANG	I8 200	08:00	08:45	FRIDAY & SUNDAY	ATR42	DIRECT
		PANGKALANBUN	I8 206	10:15	11:15	MON, FRI, SAT, SUN	ATR42	DIRECT
		KETAPANG	I8 202	08:10	08:45	MONDAY & SATURDAY	ATR42	DIRECT
7	SINTANG	PONTIANAK	I8 201	09:00	09:45	FRIDAY & SUNDAY	ATR42	DIRECT
8	PANGKALAN BUN	PONTIANAK	I8 207	15:30	16:30	MON, FRI, SAT, SUN	ATR42	DIRECT
9	KETAPANG	PONTIANAK	I8 203	09:00	09:35	MONDAY & SATURDAY	ATR42	DIRECT

➔ Jawab :
1) **Langkah 1**
   NF

NO	FROM	TO	FLIGHT NO.	ETA	ETD	DAY OF SERVICES	FLEET	REMARKS
1	Bandung	Padang	I8 6420	6:00	7:40	Daily	A320	DI RECT
		Palembang	I8 6440	10:10	11:20	Daily	A320	DI RECT
		Medan	I8 6440	10:10	13:20	Daily	A320	VIA PALEMBANG
		Pekanbaru	I8 6450	17:30	19:10	Daily	A320	DI RECT
2	Medan	Palembang	I8 6441	13:50	15:30	Daily	A320	DI RECT
		Bandung	I8 6441	13:50	17:05	Daily	A320	VIA PALEMBANG
3	Padang	Bandung	I8 6251	8:05	9:45	Daily	A320	DI RECT
4	Pekan Baru	bandung	I8 6251	19:35	21:15	Daily	A320	DI RECT
5	Palembang	bandung	I8 6441	15:55	17:05	Daily	A320	DI RECT
		Medan	I8 6440	11:45	13:02	Daily	A320	DI RECT
6	Pontianak	Sintang	I8 200	8:00	8:45	Friday & Sunday	ATR42	DI RECT
		Pangkalambun	I8 206	10:15	11:15	Mon, Fri, Sat, Sun	ATR42	DI RECT
		Ketapang	I8 202	8:10	8:45	Monday & Saturday	ATR42	DI RECT
7	Sintang	Pontianak	I8 201	9:00	9:45	Friday & Sunday	ATR42	DI RECT
8	Pangkalan Bun	Pontianak	I8 207	15:30	16:30	Mon, Fri, Sat, Sun	ATR42	DI RECT
9	Ketapang	Pontianak	I8 203	9:00	9:35	Monday & Saturday	ATR42	DI RECT

2) Langkah 2
   1NF

NO	FROM	TO	FLIGHT NO.	ETA	ETD	DAY OF SERVICES	FLEET	REMARKS
1	Bandung	Padang	I8 6420	6:00	7:40	Daily	A320	DI RECT
1	Bandung	Palembang	I8 6440	10:10	11:20	Daily	A320	DI RECT
1	Bandung	Medan	I8 6440	10:10	13:20	Daily	A320	VIA PALEMBANG
1	Bandung	Pekanbaru	I8 6450	17:30	19:10	Daily	A320	DI RECT
2	Medan	Palembang	I8 6441	13:50	15:30	Daily	A320	DI RECT
2	Medan	Bandung	I8 6441	13:50	17:05	Daily	A320	VIA PALEMBANG
3	Padang	Bandung	I8 6251	8:05	9:45	Daily	A320	DI RECT
4	Pekan Baru	bandung	I8 6251	19:35	21:15	Daily	A320	DI RECT
5	Palembang	bandung	I8 6441	15:55	17:05	Daily	A320	DI RECT
5	Palembang	Medan	I8 6440	11:45	13:02	Daily	A320	DI RECT
6	Pontianak	Sintang	I8 200	8:00	8:45	Friday & Sunday	ATR42	DI RECT
6	Pontianak	Pangkalambun	I8 206	10:15	11:15	Mon, Fri, Sat, Sun	ATR42	DI RECT
6	Pontianak	Ketapang	I8 202	8:10	8:45	Monday & Saturday	ATR42	DI RECT
7	Sintang	Pontianak	I8 201	9:00	9:45	Friday & Sunday	ATR42	DI RECT
8	Pangkalan Bun	Pontianak	I8 207	15:30	16:30	Mon, Fri, Sat, Sun	ATR42	DI RECT
9	Ketapang	Pontianak	I8 203	9:00	9:35	Monday & Saturday	ATR42	DI RECT

3) Langkah 3
   2NF

> **Tabel Rute**

ROUTE NO.	NO	FROM	TO	FLIGHT NO.
BAN-1	1	Bandung	Padang	I8 6420
BAN-2	1	Bandung	Palembang	I8 6440
BAN-3	1	Bandung	Medan	I8 6440
BAN-4	1	Bandung	Pekanbaru	I8 6450
MED-1	2	Medan	Palembang	I8 6441
MED-2	2	Medan	Bandung	I8 6441
PAD-1	3	Padang	Bandung	I8 6251
PEK-1	4	Pekanbaru	bandung	I8 6251
PAL-1	5	Palembang	bandung	I8 6441
PAL-1	5	Palembang	Medan	I8 6440
PON1	6	Pontianak	Sintang	I8 200
PON-2	6	Pontianak	Pangkalambun	I8 206
PON-3	6	Pontianak	Ketapang	I8 202
SIN-1	7	Sintang	Pontianak	I8 201
PAN-1	8	Pangkalan Bun	Pontianak	I8 207
KET-1	9	Ketapang	Pontianak	I8 203

> **Tabel Penerbangan**

FLIGHT NO.	ETA	ETD	DAY OF SERVICES	FLEET	REMARKS
I8 6420	6:00	7:40	Daily	A320	DI RECT
I8 6440	10:10	11:20	Daily	A320	DI RECT
I8 6440	10:10	13:20	Daily	A320	VIA PALEMBANG
I8 6450	17:30	19:10	Daily	A320	DI RECT
I8 6441	13:50	15:30	Daily	A320	DI RECT
I8 6441	13:50	17:05	Daily	A320	VIA PALEMBANG
I8 6251	8:05	9:45	Daily	A320	DI RECT
I8 6251	19:35	21:15	Daily	A320	DI RECT
I8 6441	15:55	17:05	Daily	A320	DI RECT
I8 6440	11:45	13:02	Daily	A320	DI RECT
I8 200	8:00	8:45	Friday & Sunday	ATR42	DI RECT
I8 206	10:15	11:15	Mon, Fri, Sat, Sun	ATR42	DI RECT
I8 202	8:10	8:45	Monday & Saturday	ATR42	DI RECT
I8 201	9:00	9:45	Friday & Sunday	ATR42	DI RECT
I8 207	15:30	16:30	Mon, Fri, Sat, Sun	ATR42	DI RECT
I8 203	9:00	9:35	Monday & Saturday	ATR42	DI RECT

➢ **Tabel Fleet**

FLEET NO.	FLEET	REMARKS
F-1	A320	DI RECT
F-2	A320	VIA PALEMBANG
F-3	ATR42	DI RECT

➢ **Tabel Day Of Service**

SER NO.	DAY OF SERVICES
DOS-1	Daily
DOS-2	Friday & Sunday
DOS-3	Mon, Fri, Sat, Sun
DOS-4	Monday & Saturday

4) Langkah 4

3NF

➢ **Tabel Rute**

ROUTE NO.	NO	FROM	TO	Id Flight
BAN-1	1	Bandung	Padang	FL-1
BAN-2	1	Bandung	Palembang	FL-2
BAN-3	1	Bandung	Medan	FL-3
BAN-4	1	Bandung	Pekanbaru	FL-4
MED-1	2	Medan	Palembang	FL-5
MED-2	2	Medan	Bandung	FL-6
PAD-1	3	Padang	Bandung	FL-7
PEK-1	4	Pekanbaru	bandung	FL-8
PAL-1	5	Palembang	bandung	FL-9
PAL-1	5	Palembang	Medan	FL-10
PON1	6	Pontianak	Sintang	FL-11
PON-2	6	Pontianak	Pangkalambun	FL-12
PON-3	6	Pontianak	Ketapang	FL-13
SIN-1	7	Sintang	Pontianak	FL-14
PAN-1	8	Pangkalan Bun	Pontianak	FL-15
KET-1	9	Ketapang	Pontianak	FL-16

➢ **Tabel Penerbangan**

Tabel Penerbangan

Id Flight	FLIGHT NO.	ETA	ETD	SER NO.	FLEET NO.
FL-1	I8 6420	6:00	7:40	DOS-1	F-1
FL-2	I8 6440	10:10	11:20	DOS-1	F-1
FL-3	I8 6440	10:10	13:20	DOS-1	F-2
FL-4	I8 6450	17:30	19:10	DOS-1	F-1
FL-5	I8 6441	13:50	15:30	DOS-1	F-1
FL-6	I8 6441	13:50	17:05	DOS-1	F-2
FL-7	I8 6251	8:05	9:45	DOS-1	F-1
FL-8	I8 6251	19:35	21:15	DOS-1	F-1
FL-9	I8 6441	15:55	17:05	DOS-1	F-1
FL-10	I8 6440	11:45	13:02	DOS-1	F-1
FL-11	I8 200	8:00	8:45	DOS-2	F-3
FL-12	I8 206	10:15	11:15	DOS-3	F-3
FL-13	I8 202	8:10	8:45	DOS-4	F-3
FL-14	I8 201	9:00	9:45	DOS-2	F-3
FL-15	I8 207	15:30	16:30	DOS-3	F-3
FL-16	I8 203	9:00	9:35	DOS-4	F-3

➢ **Tabel Fleet**

FLEET NO.	FLEET	REMARKS
F-1	A320	DI RECT
F-2	A320	VIA PALEMBANG
F-3	ATR42	DI RECT

➢ **Tabel Day of Service**

SER NO.	DAY OF SERVICES
DOS-1	Daily
DOS-2	Friday & Sunday
DOS-3	Mon, Fri, Sat, Sun
DOS-4	Monday & Saturday