

Praktikum 2- STA261

KONSEP DASAR BASIS DATA

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— Bogor Indonesia —

Study Program
Statistics and Data Science
Department of Statistics

Istilah dalam Basis Data

ENTERPRISE

organisasi atau lembaga yang mengelola basis data (*database*)

Contoh
Universitas,
Rumah Sakit,
Bank

ENTITY

objek yang akan disimpan dan dapat dibedakan dengan objek lain

Contoh:
Mahasiswa,
Mata Kuliah,
Dosen,
Fakultas

ATTRIBUTE

disebut juga **Field**, adalah unsur-unsur pada entity yang berisi data

Contoh:
NIM, Nama,
Fakultas,
Jurusan

DATA VALUE

data yang tersimpan pada setiap field

Contoh:
Budiman,
Wahyu, Desi

RECORD

Disebut juga **Tuple**, adalah kumpulan unsur-unsur data yang saling berkaitan menginformasikan tentang suatu entity secara lengkap

KEY

pengenal unik untuk mengidentifikasi suatu entity

Istilah dalam Basis Data

```
Command Prompt - sqlite3 chinook.db
Microsoft Windows [Version 10.0.19042.1165]
(c) Microsoft Corporation. All rights reserved.

C:\Users\User>cd C:/sqlite

C:\sqlite>sqlite3 chinook.db
SQLite version 3.33.0 2020-08-14 13:23:32
Enter ".help" for usage hints.
sqlite> .database
main: C:\sqlite\chinook.db
sqlite> .table
albums          employees      invoices      playlists
artists         genres        media_types   tracks
customers       invoice_items playlist_track
sqlite>
```

DB Browser for SQLite - C:\sqlite\chinook.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Create Table Create Index Print

Name	Type	Schema
Tables (13)		
albums		CREATE TABLE "albums" ([AlbumId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Title] NVARCHAR(160) NOT NULL, [Art
artists		CREATE TABLE "artists" ([ArtistId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Name] NVARCHAR(120))
customers		CREATE TABLE "customers" ([CustomerId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [FirstName] NVARCHAR(40) NOT
employees		CREATE TABLE "employees" ([EmployeeId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [LastName] NVARCHAR(20) NO
genres		CREATE TABLE "genres" ([GenreId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Name] NVARCHAR(120))
invoice_items		CREATE TABLE "invoice_items" ([InvoiceItemId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [InvoiceId] INTEGER NOT NU
invoices		CREATE TABLE "invoices" ([InvoiceId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [CustomerId] INTEGER NOT NULL, [Inv
media_types		CREATE TABLE "media_types" ([MediaTypeId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Name] NVARCHAR(120))
playlist_track		CREATE TABLE "playlist_track" ([PlaylistId] INTEGER NOT NULL, [TrackId] INTEGER NOT NULL, CONSTRAINT [PK_PlaylistTrack] PRIM
playlists		CREATE TABLE "playlists" ([PlaylistId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Name] NVARCHAR(120))
sqlite_sequence		CREATE TABLE sqlite_sequence(name,seq)
sqlite_stat1		CREATE TABLE sqlite_stat1(tbl,idx,stat)
tracks		CREATE TABLE "tracks" ([TrackId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL, [Name] NVARCHAR(200) NOT NULL, [Albu
Indexes (10)		
IFK_AlbumArtistId		CREATE INDEX [IFK_AlbumArtistId] ON "albums" ([ArtistId])
IFK_CustomerSupportRepId		CREATE INDEX [IFK_CustomerSupportRepId] ON "customers" ([SupportRepId])
IFK_EmployeeReportsTo		CREATE INDEX [IFK_EmployeeReportsTo] ON "employees" ([ReportsTo])
IFK_InvoiceCustomerId		CREATE INDEX [IFK_InvoiceCustomerId] ON "invoices" ([CustomerId])
IFK_InvoiceLineInvoiceId		CREATE INDEX [IFK_InvoiceLineInvoiceId] ON "invoice_items" ([InvoiceId])
IFK_InvoiceLineTrackId		CREATE INDEX [IFK_InvoiceLineTrackId] ON "invoice_items" ([TrackId])
IFK_PlaylistTrackTrackId		CREATE INDEX [IFK_PlaylistTrackTrackId] ON "playlist_track" ([TrackId])
IFK_TrackAlbumId		CREATE INDEX [IFK_TrackAlbumId] ON "tracks" ([AlbumId])
IFK_TrackGenreId		CREATE INDEX [IFK_TrackGenreId] ON "tracks" ([GenreId])
IFK_TrackMediaTypeId		CREATE INDEX [IFK_TrackMediaTypeId] ON "tracks" ([MediaTypeId])

Edit Database Cell

Mode: Text

Type of data currently in cell: Text / Numeric

1 character(s)

Apply

Remote

Identity Public

Name Commit Last

SQL Log Plot DB Schema Remote

Windows Ink Workspace UTF-8

Entity

Istilah dalam Basis Data

Attribute/ Field

```
sqlite> .schema invoices
CREATE TABLE IF NOT EXISTS "invoices"
(
  [InvoiceId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
  [CustomerId] INTEGER NOT NULL,
  [InvoiceDate] DATETIME NOT NULL,
  [BillingAddress] NVARCHAR(70),
  [BillingCity] NVARCHAR(40),
  [BillingState] NVARCHAR(40),
  [BillingCountry] NVARCHAR(40),
  [BillingPostalCode] NVARCHAR(10),
  [Total] NUMERIC(10, 2) NOT NULL,
  FOREIGN KEY ([CustomerId]) REFERENCES "customers" ([CustomerId])
  ON DELETE NO ACTION ON UPDATE NO ACTION
);
CREATE INDEX [IFK_InvoiceCustomerId] ON "invoices" ([CustomerId]);
sqlite>
```

DB Browser for SQLite - C:\sqlite\chinook.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Table: Invoices Filter in any column

	InvoiceId	CustomerId	InvoiceDate	BillingAddress	BillingCity	BillingState	BillingCountry	BillingPostalCode	Total
1	1	2	2009-01-01 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	1.98
2	2	4	2009-01-02 00:00:00	Ullevålsveien 14	Oslo	NULL	Norway	0171	3.96
3	3	8	2009-01-03 00:00:00	Grétrystraat 63	Brussels	NULL	Belgium	1000	5.94
4	4	14	2009-01-06 00:00:00	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	8.91
5	5	23	2009-01-11 00:00:00	69 Salem Street	Boston	MA	USA	2113	13.86
6	6	37	2009-01-19 00:00:00	Berger Straße 10	Frankfurt	NULL	Germany	60316	0.99
7	7	38	2009-02-01 00:00:00	Barbarossastraße 19	Berlin	NULL	Germany	10779	1.98
8	8	40	2009-02-01 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	1.98
9	9	42	2009-02-02 00:00:00	9, Place Louis Barthou	Bordeaux	NULL	France	33000	3.96
10	10	46	2009-02-03 00:00:00	3 Chatham Street	Dublin	Dublin	Ireland	NULL	5.94
11	11	52	2009-02-06 00:00:00	202 Hoxton Street	London	NULL	United Kingdom	N1 5LH	8.91
12	12	2	2009-02-11 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	13.86
13	13	16	2009-02-19 00:00:00	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	0.99
14	14	17	2009-03-04 00:00:00	1 Microsoft Way	Redmond	WA	USA	98052-8300	1.98
15	15	19	2009-03-04 00:00:00	1 Infinite Loop	Cupertino	CA	USA	95014	1.98
16	16	21	2009-03-05 00:00:00	801 W 4th Street	Reno	NV	USA	89503	3.96
17	17	25	2009-03-06 00:00:00	319 N. Frances Street	Madison	WI	USA	53703	5.94
18	18	31	2009-03-09 00:00:00	194A Chain Lake Drive	Halifax	NS	Canada	B3S 1C5	8.91
19	19	40	2009-03-14 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	13.86

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UTF-8

Istilah dalam Basis Data

DB Browser for SQLite - C:\sqlite\chinook.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Table: invoices Filter in any column

InvoiceId	CustomerId	InvoiceDate	BillingAddress	BillingCity	BillingState	BillingCountry	BillingPostalCode	Total
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	1	2 2009-01-01 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	1.98
2	2	4 2009-01-02 00:00:00	Ullevålsveien 14	Oslo	NULL	Norway	0171	3.96
3	3	8 2009-01-03 00:00:00	Grêtrystraat 63	Brussels	NULL	Belgium	1000	5.94
4	4	14 2009-01-06 00:00:00	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	8.91
5	5	23 2009-01-11 00:00:00	69 Salem Street	Boston	MA	USA	2113	13.86
6	6	37 2009-01-19 00:00:00	Berger Straße 10	Frankfurt	NULL	Germany	60316	0.99
7	7	38 2009-02-01 00:00:00	Barbarossastraße 19	Berlin	NULL	Germany	10779	1.98
8	8	40 2009-02-01 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	1.98
9	9	42 2009-02-02 00:00:00	9, Place Louis Barthou	Bordeaux	NULL	France	33000	3.96
10	10	46 2009-02-03 00:00:00	3 Chatham Street	Dublin	Dublin	Ireland	NULL	5.94
11	11	52 2009-02-06 00:00:00	202 Hoxton Street	London	NULL	United Kingdom	N1 5LH	8.91
12	12	2 2009-02-11 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	13.86
13	13	16 2009-02-19 00:00:00	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	0.99
14	14	17 2009-03-04 00:00:00	1 Microsoft Way	Redmond	WA	USA	98052-8300	1.98
15	15	19 2009-03-04 00:00:00	1 Infinite Loop	Cupertino	CA	USA	95014	1.98
16	16	21 2009-03-05 00:00:00	801 W 4th Street	Reno	NV	USA	89503	3.96
17	17	25 2009-03-06 00:00:00	319 N. Frances Street	Madison	WI	USA	53703	5.94
18	18	31 2009-03-09 00:00:00	194A Chain Lake Drive	Halifax	NS	Canada	B3S 1C5	8.91
19	19	40 2009-03-14 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	13.86

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UTF-8

```
sqlite> Select BillingCity from invoices limit 10;  
Stuttgart  
Oslo  
Brussels  
Edmonton  
Boston  
Frankfurt  
Berlin  
Paris  
Bordeaux  
Dublin  
sqlite>
```

Data Value

Istilah dalam Basis Data

Record/Tuple

DB Browser for SQLite - C:\sqlite\chinook.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Table: invoices

	InvoiceId	CustomerId	InvoiceDate	BillingAddress	BillingCity	BillingState	BillingCountry	BillingPostalCode	Total
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	1	2	2009-01-01 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	1.98
2	2	4	2009-01-02 00:00:00	Ullevålsveien 14	Oslo	NULL	Norway	0171	3.96
3	3	8	2009-01-03 00:00:00	Grétrystraat 63	Brussels	NULL	Belgium	1000	5.94
4	4	14	2009-01-06 00:00:00	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	8.91
5	5	23	2009-01-11 00:00:00	69 Salem Street	Boston	MA	USA	2113	13.86
6	6	37	2009-01-19 00:00:00	Berger Straße 10	Frankfurt	NULL	Germany	60316	0.99
7	7	38	2009-02-01 00:00:00	Barbarossastraße 19	Berlin	NULL	Germany	10779	1.98
8	8	40	2009-02-01 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	1.98
9	9	42	2009-02-02 00:00:00	9, Place Louis Barthou	Bordeaux	NULL	France	33000	3.96
10	10	46	2009-02-03 00:00:00	3 Chatham Street	Dublin	Dublin	Ireland	NULL	5.94
11	11	52	2009-02-06 00:00:00	202 Hoxton Street	London	NULL	United Kingdom	N1 5LH	8.91
12	12	2	2009-02-11 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	13.86
13	13	16	2009-02-19 00:00:00	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	0.99
14	14	17	2009-03-04 00:00:00	1 Microsoft Way	Redmond	WA	USA	98052-8300	1.98
15	15	19	2009-03-04 00:00:00	1 Infinite Loop	Cupertino	CA	USA	95014	1.98
16	16	21	2009-03-05 00:00:00	801 W 4th Street	Reno	NV	USA	89503	3.96
17	17	25	2009-03-06 00:00:00	319 N. Frances Street	Madison	WI	USA	53703	5.94
18	18	31	2009-03-09 00:00:00	194A Chain Lake Drive	Halifax	NS	Canada	B3S 1C5	8.91
19	19	40	2009-03-14 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	13.86

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```
sqlite> select * from invoices limit 10;
1|2|2009-01-01 00:00:00|Theodor-Heuss-Straße 34|Stuttgart||Germany|70174|1.98
2|4|2009-01-02 00:00:00|Ullevålsveien 14|Oslo||Norway|0171|3.96
3|8|2009-01-03 00:00:00|Grétrystraat 63|Brussels||Belgium|1000|5.94
4|14|2009-01-06 00:00:00|8210 111 ST NW|Edmonton|AB|Canada|T6G 2C7|8.91
5|23|2009-01-11 00:00:00|69 Salem Street|Boston|MA|USA|2113|13.86
6|37|2009-01-19 00:00:00|Berger Straße 10|Frankfurt||Germany|60316|0.99
7|38|2009-02-01 00:00:00|Barbarossastraße 19|Berlin||Germany|10779|1.98
8|40|2009-02-01 00:00:00|8, Rue Hanovre|Paris||France|75002|1.98
9|42|2009-02-02 00:00:00|9, Place Louis Barthou|Bordeaux||France|33000|3.96
10|46|2009-02-03 00:00:00|3 Chatham Street|Dublin|Dublin|Ireland||5.94
sqlite>
```

Istilah dalam Basis Data

Key (Primary)

```
sqlite> .schema invoices
CREATE TABLE IF NOT EXISTS "invoices"
(
  [InvoiceId] INTEGER PRIMARY KEY AUTOINCREMENT NOT NULL,
  [CustomerId] INTEGER NOT NULL,
  [InvoiceDate] DATETIME NOT NULL,
  [BillingAddress] NVARCHAR(70),
  [BillingCity] NVARCHAR(40),
  [BillingState] NVARCHAR(40),
  [BillingCountry] NVARCHAR(40),
  [BillingPostalCode] NVARCHAR(10),
  [Total] NUMERIC(10,2) NOT NULL,
  FOREIGN KEY ([CustomerId]) REFERENCES "customers" ([CustomerId])
  ON DELETE NO ACTION ON UPDATE NO ACTION
);
CREATE INDEX [IFK_InvoiceCustomerId] ON "invoices" ([CustomerId]);
sqlite>
```

Key (Foreign)

DB Browser for SQLite - C:\sqlite\chinook.db

File Edit View Tools Help

New Database Open Database Write Changes Revert Changes Open Project Save Project Attach Database Close Database

Database Structure Browse Data Edit Pragma Execute SQL

Table: Invoices

	InvoiceId	CustomerId	InvoiceDate	BillingAddress	BillingCity	BillingState	BillingCountry	BillingPostalCode	Total
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	1	2	2009-01-01 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	1.98
2	2	4	2009-01-02 00:00:00	Ullevålsveien 14	Oslo	NULL	Norway	0171	3.96
3	3	8	2009-01-03 00:00:00	Grétrystraat 63	Brussels	NULL	Belgium	1000	5.94
4	4	14	2009-01-06 00:00:00	8210 111 ST NW	Edmonton	AB	Canada	T6G 2C7	8.91
5	5	23	2009-01-11 00:00:00	69 Salem Street	Boston	MA	USA	2113	13.86
6	6	37	2009-01-19 00:00:00	Berger Straße 10	Frankfurt	NULL	Germany	60316	0.99
7	7	38	2009-02-01 00:00:00	Barbarossastraße 19	Berlin	NULL	Germany	10779	1.98
8	8	40	2009-02-01 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	1.98
9	9	42	2009-02-02 00:00:00	9, Place Louis Barthou	Bordeaux	NULL	France	33000	3.96
10	10	46	2009-02-03 00:00:00	3 Chatham Street	Dublin	Dublin	Ireland	NULL	5.94
11	11	52	2009-02-06 00:00:00	202 Hoxton Street	London	NULL	United Kingdom	N1 5LH	8.91
12	12	2	2009-02-11 00:00:00	Theodor-Heuss-Straße 34	Stuttgart	NULL	Germany	70174	13.86
13	13	16	2009-02-19 00:00:00	1600 Amphitheatre Parkway	Mountain View	CA	USA	94043-1351	0.99
14	14	17	2009-03-04 00:00:00	1 Microsoft Way	Redmond	WA	USA	98052-8300	1.98
15	15	19	2009-03-04 00:00:00	1 Infinite Loop	Cupertino	CA	USA	95014	1.98
16	16	21	2009-03-05 00:00:00	801 W 4th Street	Reno	NV	USA	89503	3.96
17	17	25	2009-03-06 00:00:00	319 N. Frances Street	Madison	WI	USA	53703	5.94
18	18	31	2009-03-09 00:00:00	194A Chain Lake Drive	Halifax	NS	Canada	B3S 1C5	8.91
19	19	40	2009-03-14 00:00:00	8, Rue Hanovre	Paris	NULL	France	75002	13.86

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UTF-8

Skema Basis Data

Mahasiswa

<u>NIM</u>	Nama	Nama_Fakultas	Prodi
------------	------	---------------	-------

Fakultas

Kode_Fakultas	<u>Nama_Fakultas</u>
---------------	----------------------

Dosen

<u>Kode_dosen</u>	Nama_dosen	NIP	Prodi
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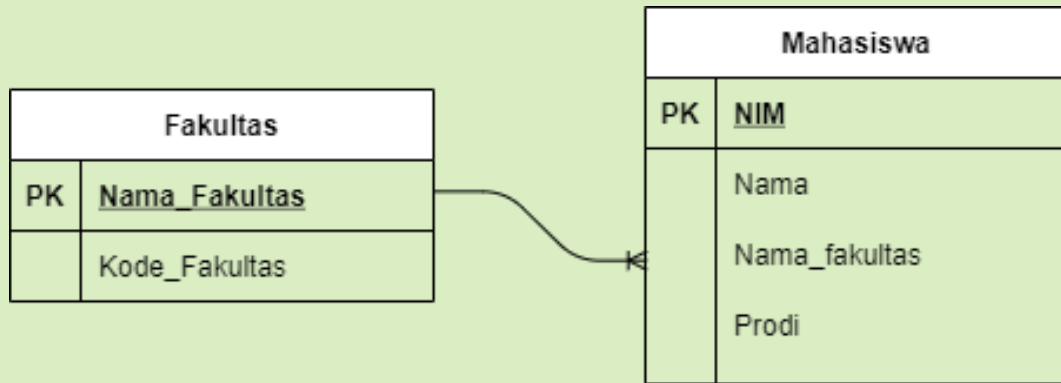
Mata Kuliah

<u>Kode_mk</u>	Nama_mk	SKS	Prodi	Kode_dosen
----------------	---------	-----	-------	------------

Skema basis data merupakan deskripsi dari basis data yang spesifikasinya ditentukan dalam tahap perancangan basis data.

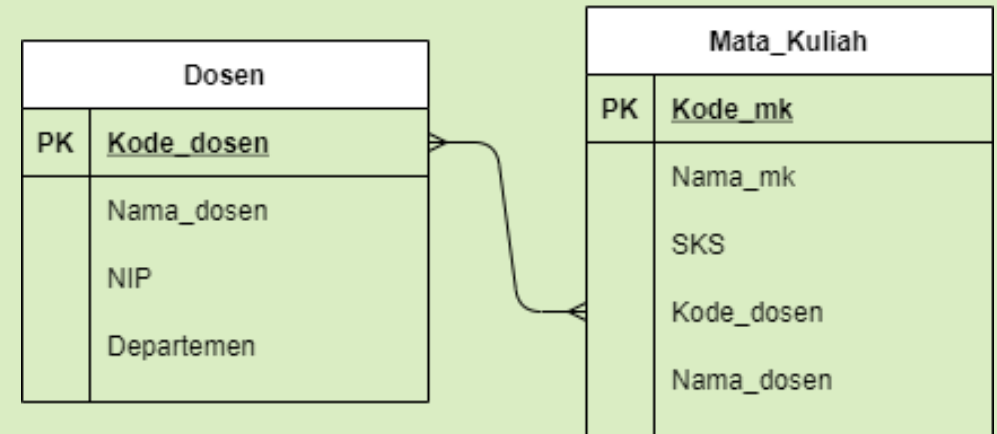
Relasi Basis Data

One to Many (1:M)



Setiap entity dapat memiliki lebih dari satu relasi dengan entity lain, akan tetapi tidak sebaliknya.

Many to Many (M:N)

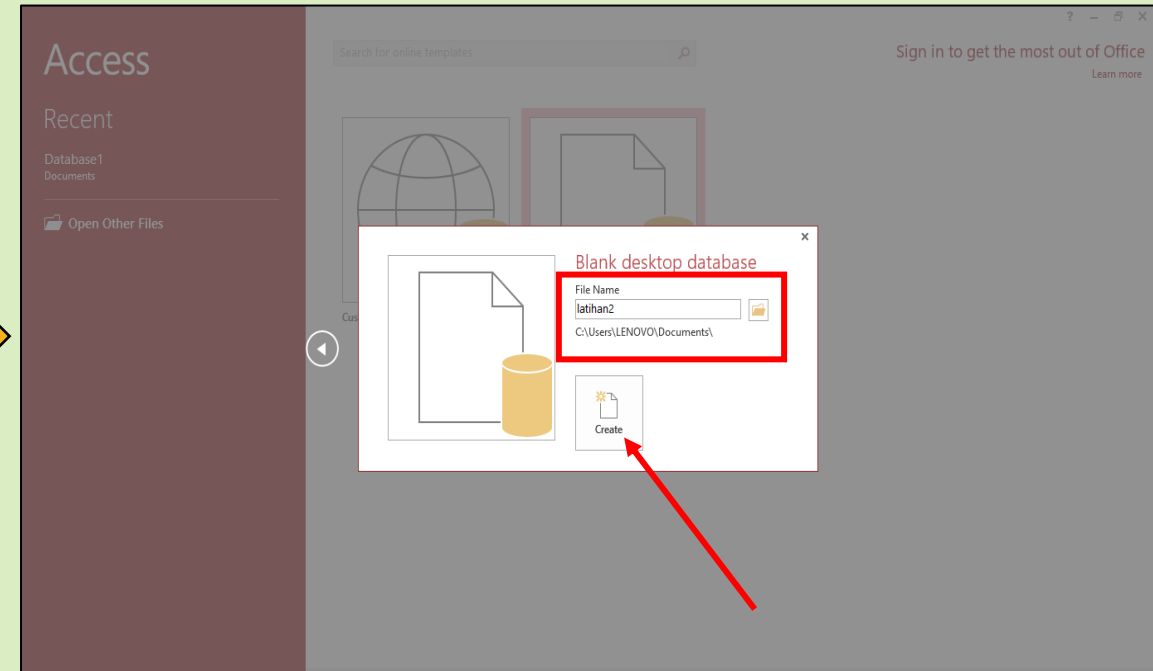
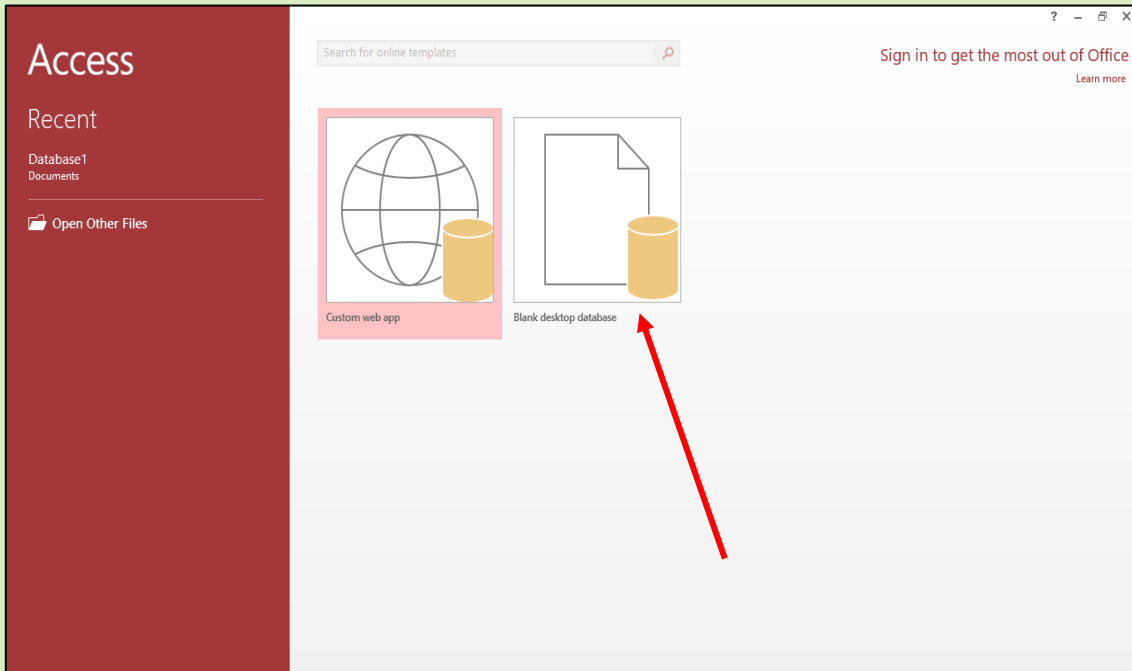


Setiap entity dapat memiliki lebih dari satu relasi dengan entity lain, dan berlaku sebaliknya.

Relasi basis data merupakan hubungan antar entity dalam suatu basis data.

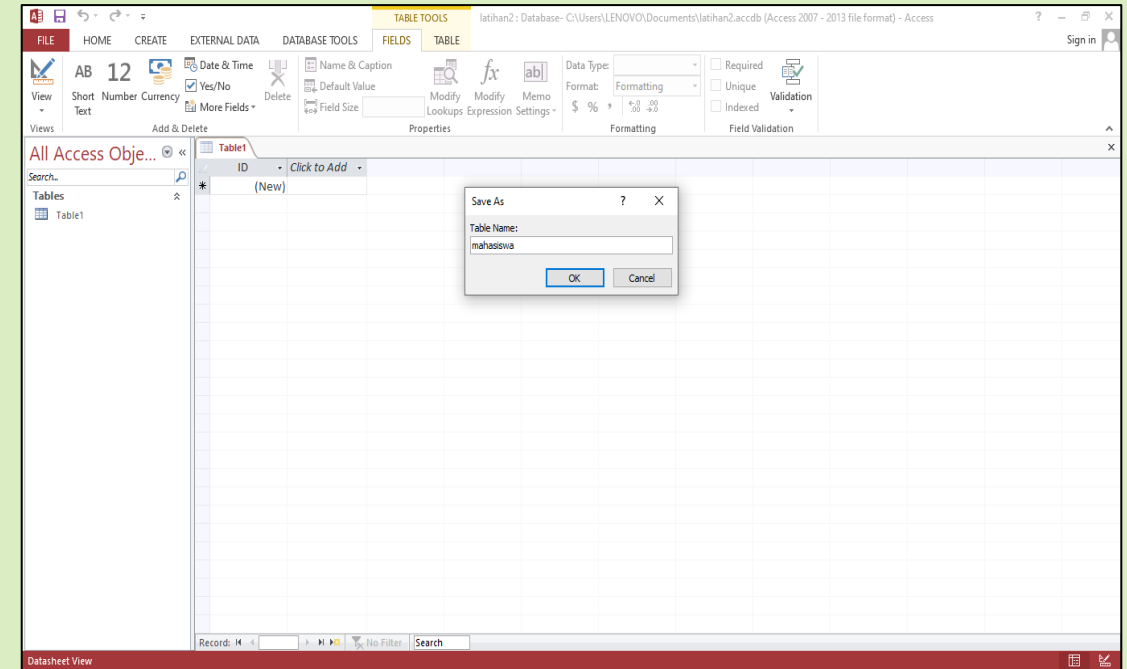
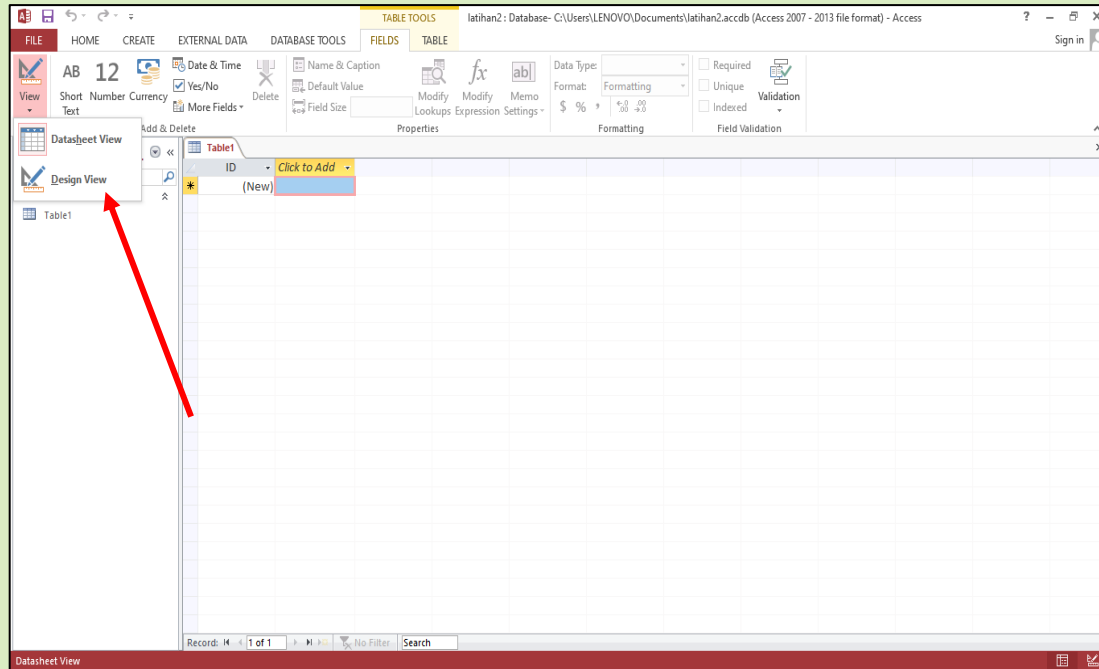


Perancangan Basis Data



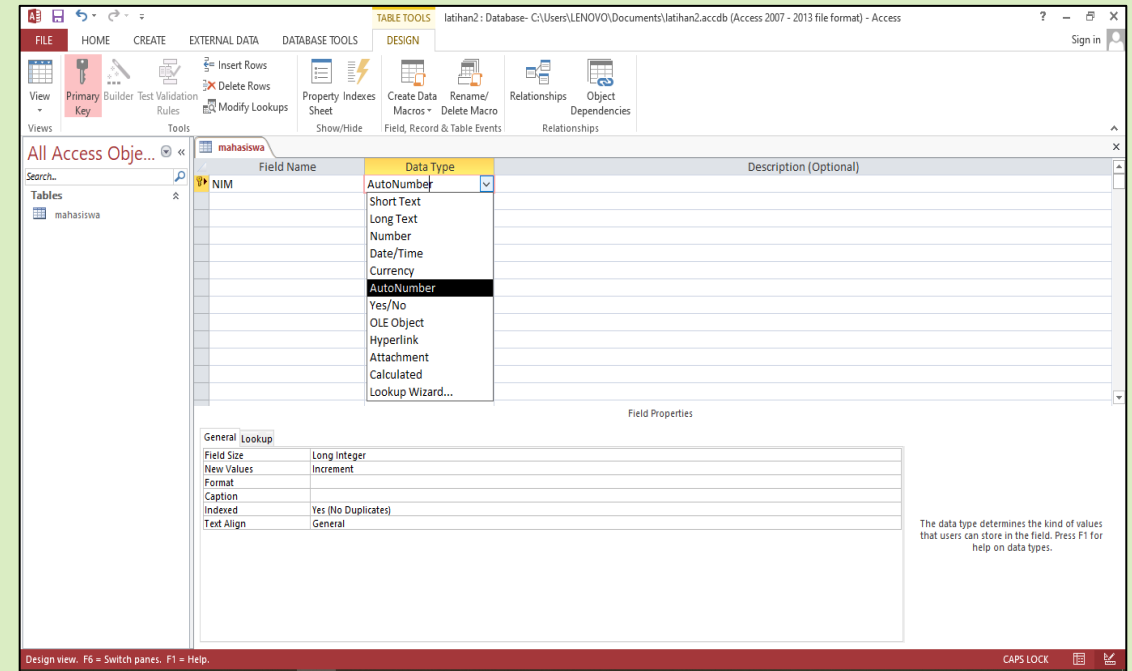
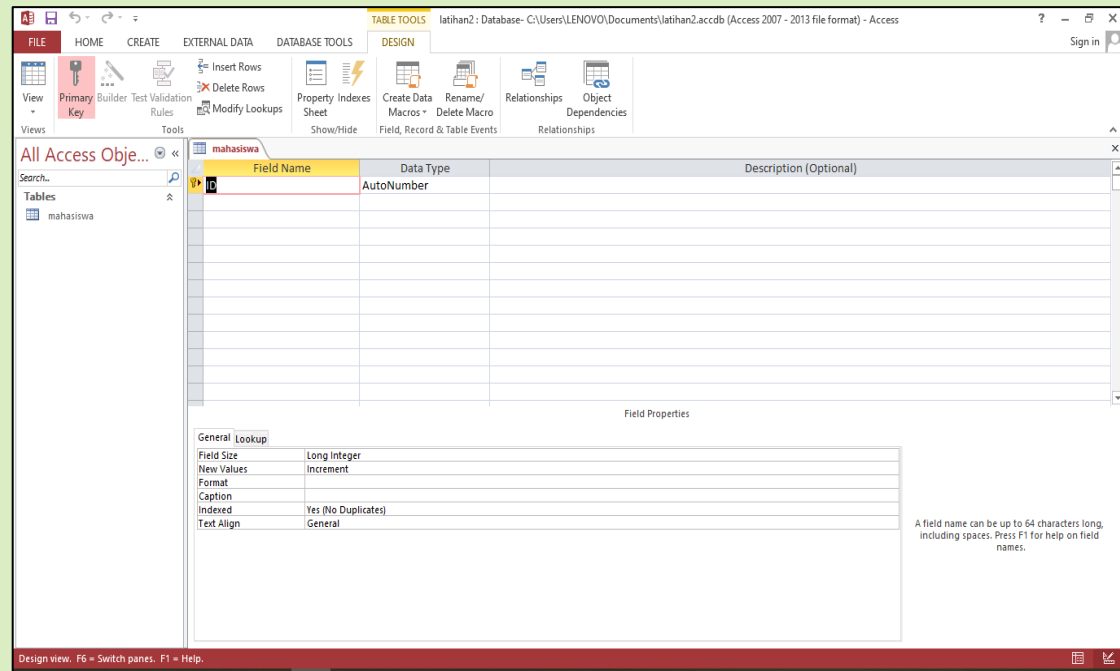
Dalam perancangan suatu basis data, salah satu langkah awal yang perlu dilakukan adalah menyusun **Entity Relationship Diagram** (ERD). *Entity Relationship Diagram* (ERD) adalah suatu diagram struktural yang umumnya digunakan dalam mendesain sebuah basis data.

Perancangan Basis Data



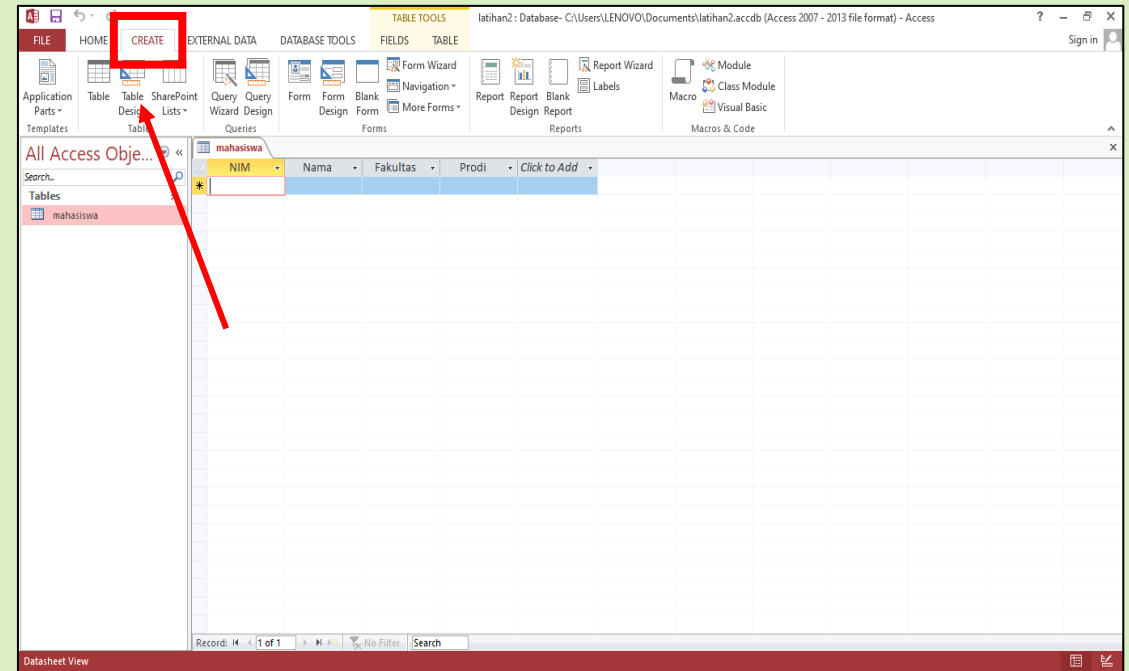
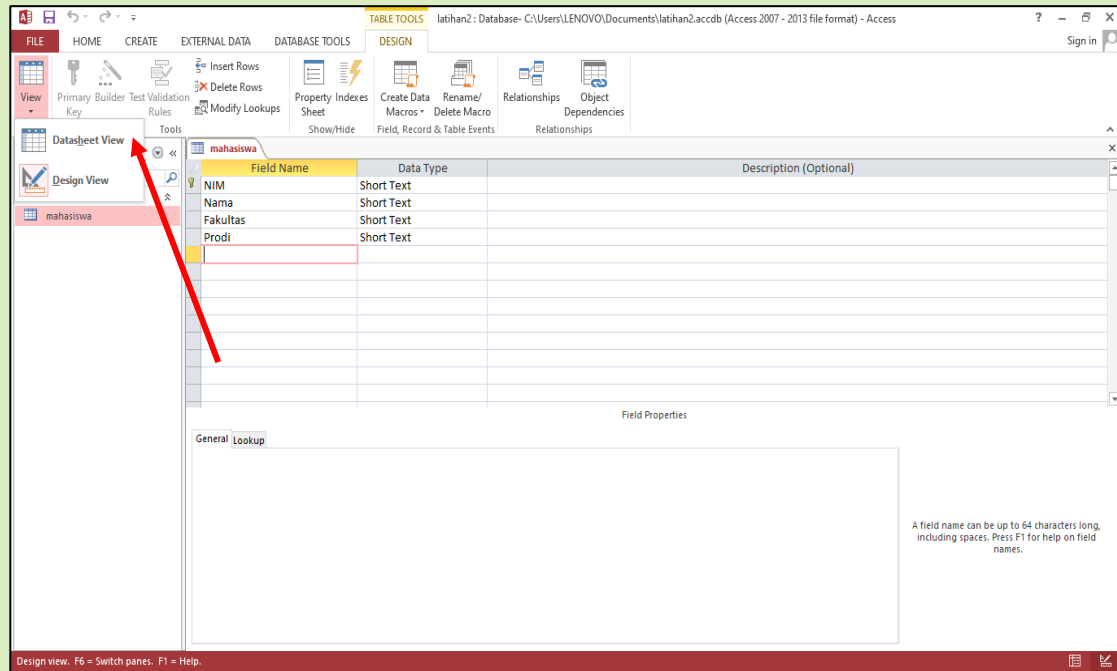
Entity Relationship Diagram (ERD)

Perancangan Basis Data



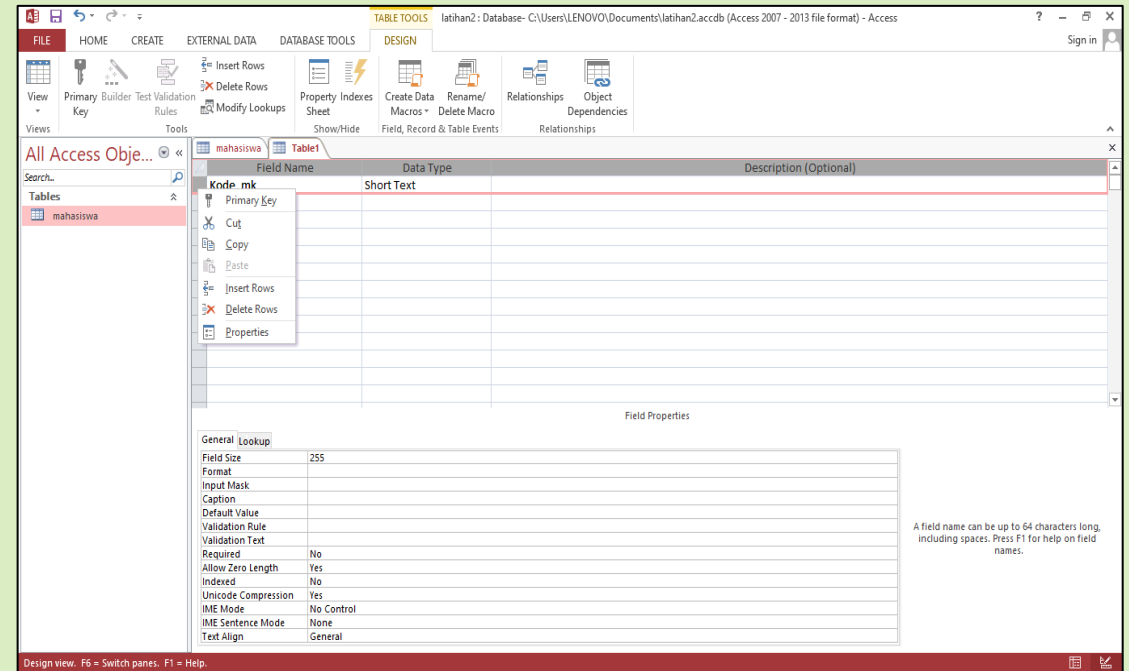
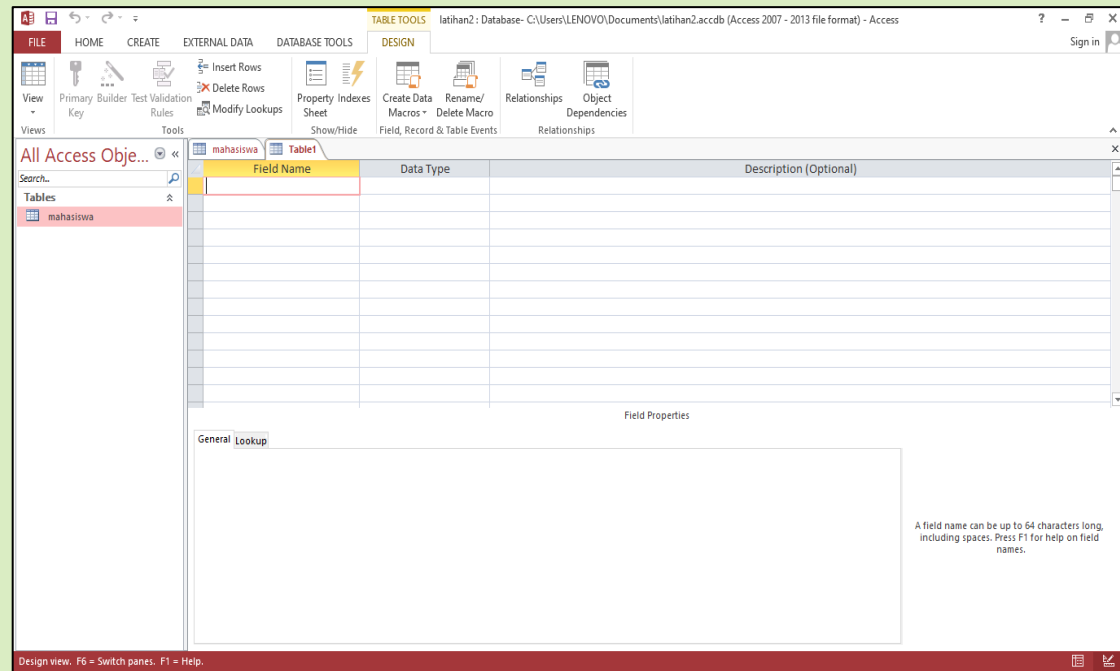
Entity Relationship Diagram (ERD)

Perancangan Basis Data



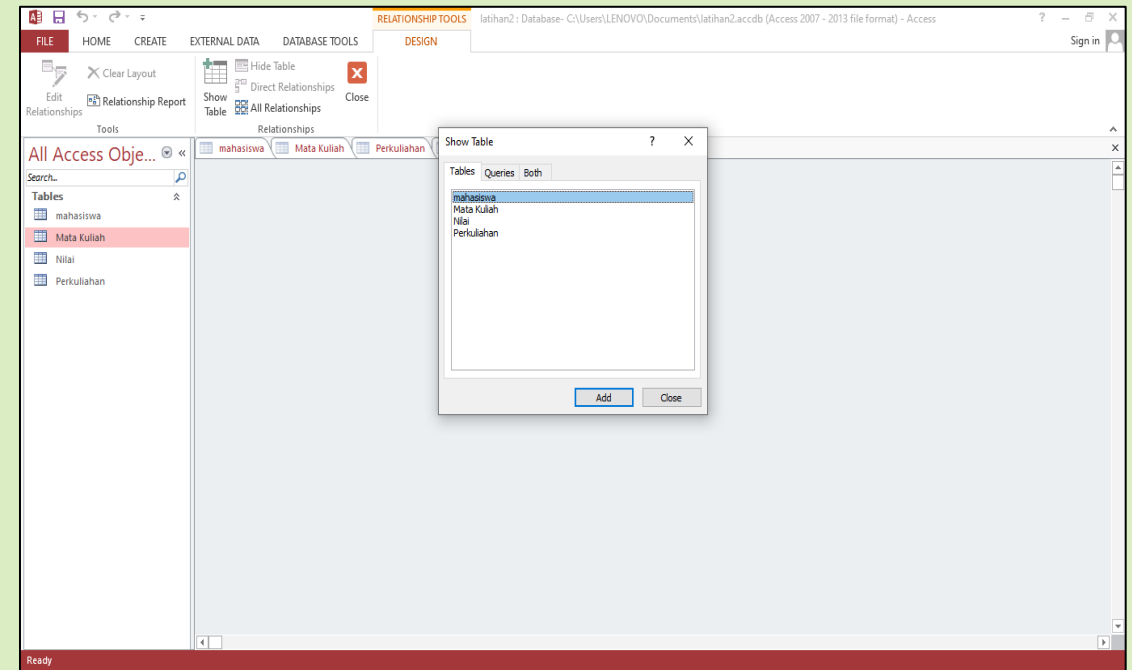
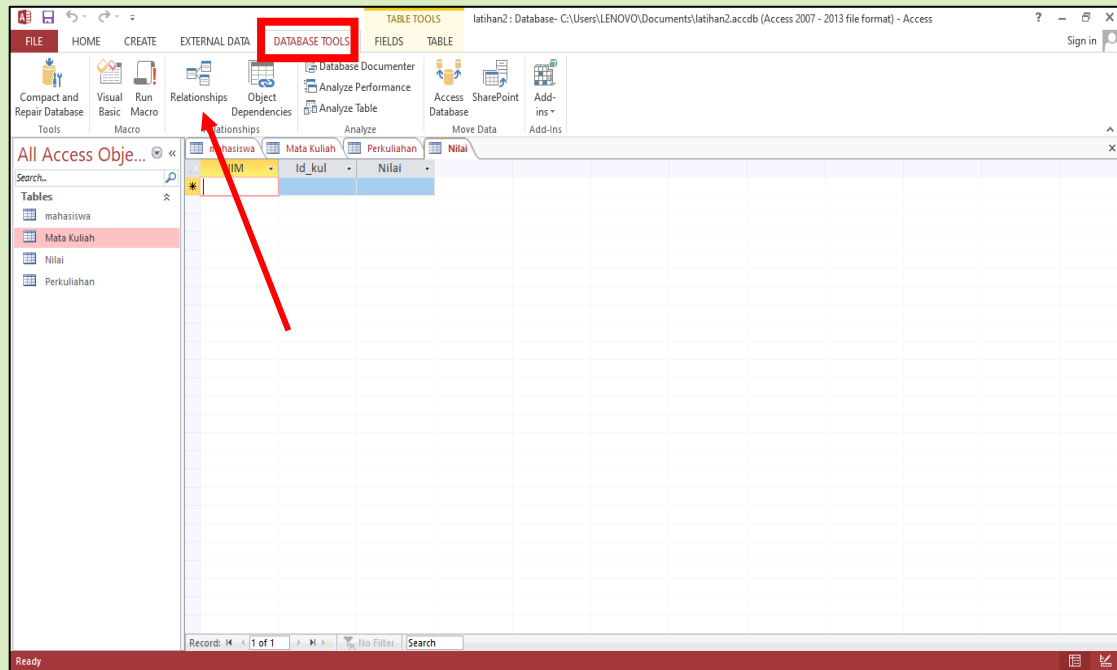
Entity Relationship Diagram (ERD)

Perancangan Basis Data



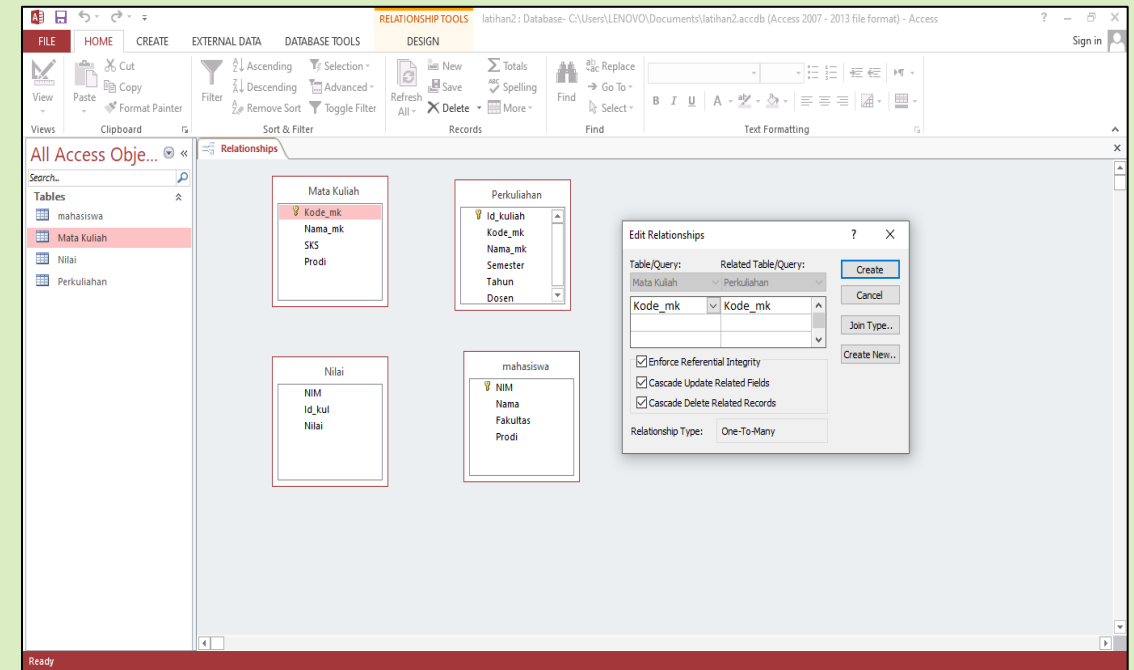
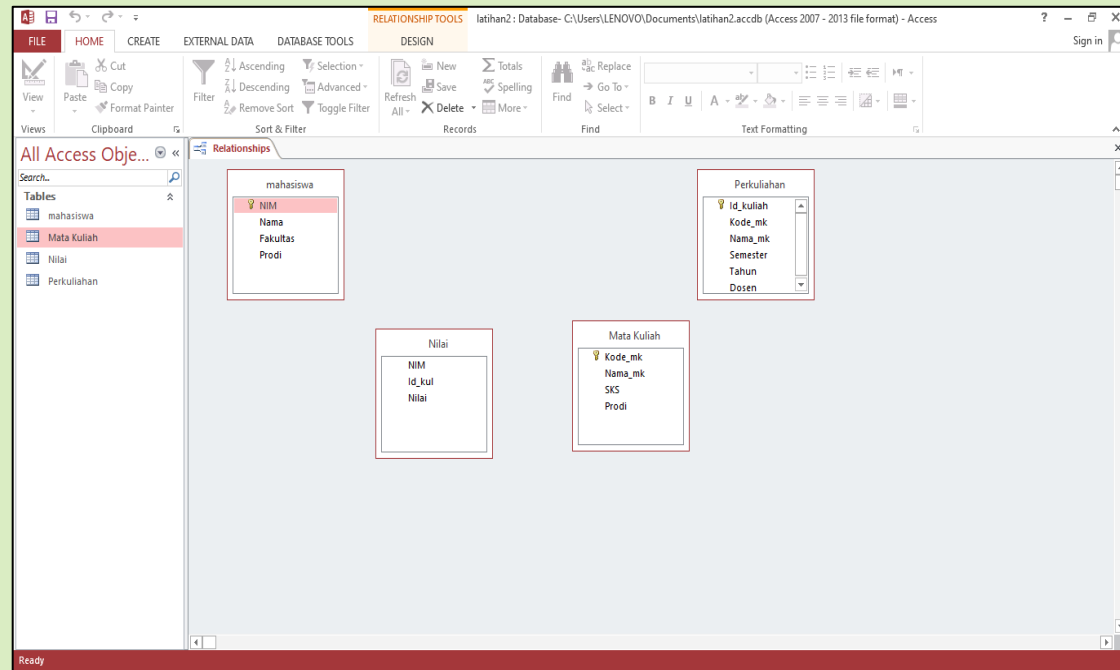
Entity Relationship Diagram (ERD)

Perancangan Basis Data



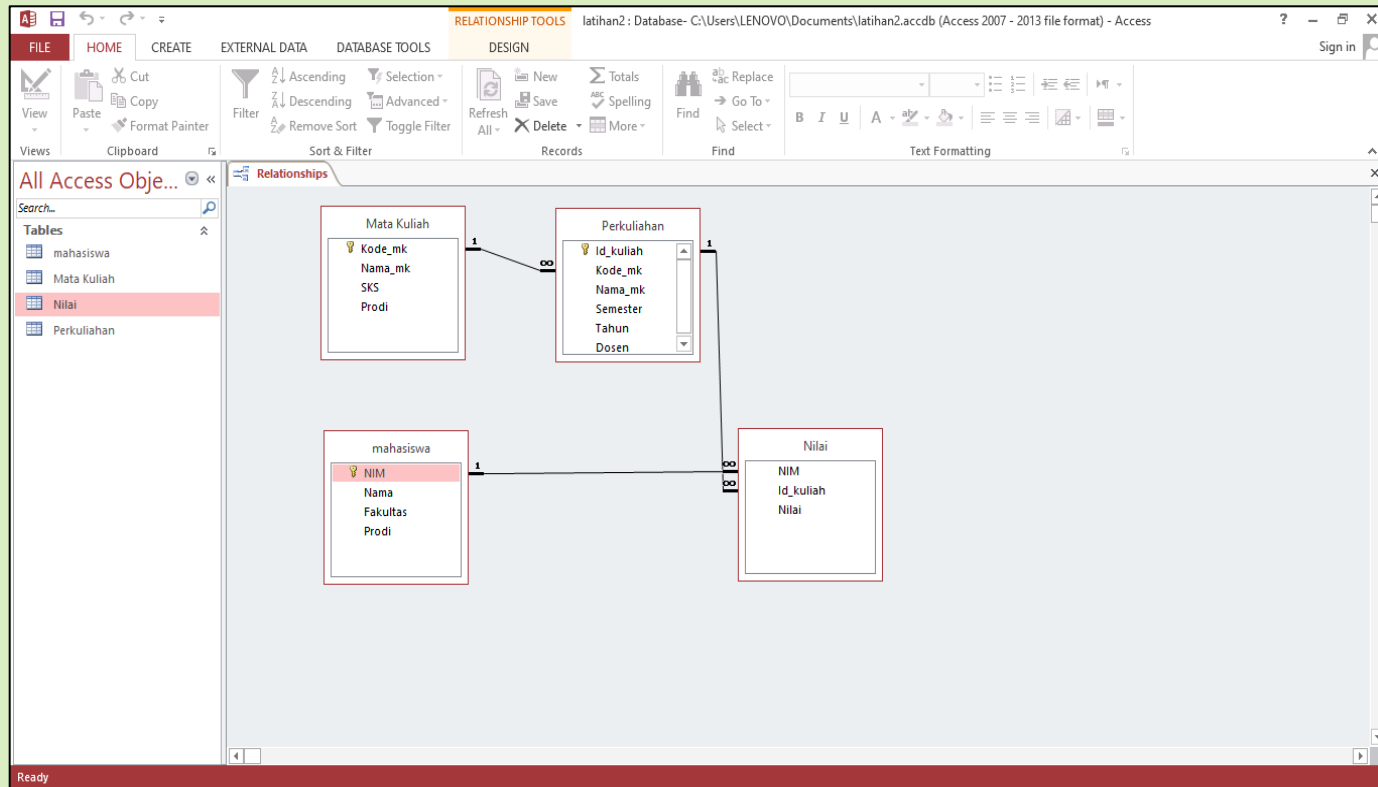
Entity Relationship Diagram (ERD)

Perancangan Basis Data



Entity Relationship Diagram (ERD)

Perancangan Basis Data



Pembuatan ERD dapat dilakukan juga melalui laman <https://app.diagrams.net/>

Entity Relationship Diagram (ERD)



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— Bogor Indonesia —

Study Program
Statistics and Data Science
Department of Statistics

TERIMA KASIH