Department Of Information Technology Malang State Polytechnic

**Jobsheet Week-4: Entity Relationship Diagram Part 2**

**Database Courses**

Created By Database Teaching Team

*Maret 2024*

## Topic

1. Top-Down & Bottom-Up Data Modeling.
2. ERD Variations
3. CASE Tools

## Goal

Students Are Expected To Gain Further Understanding Of The ERD And Its Relationship To Data Modeling, ERDVariations, And Tools That Can Be Used To Create ERD (Chen Version).

## Introduction

Data Modeling

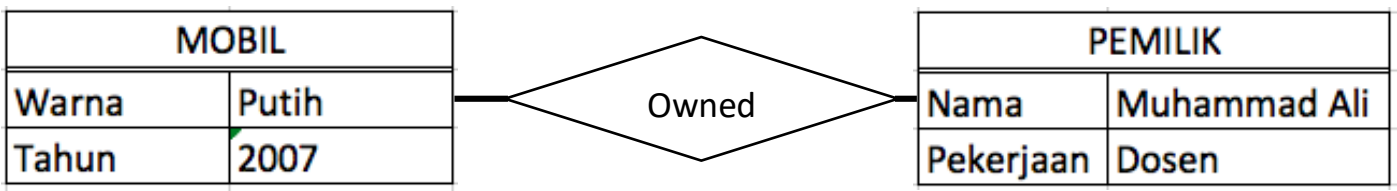
A Short Definition (Within The Scope Of Software Engineering) For Data Modeling Is The Process Of Creating A Data Model For An Information System Involving Certain Formal Techniques. In A More Complete Definition, Data Modelling Means A Process Of Analyzing The Data Requirements Needed To Support The Implementation Of Business Processes Within The Scope Of Information Systems In An Organization.

The Main Purpose Of Data Modelling Is To Convert The Requirements Of User Data Into An Actual Database That Meets Those Requirements. So That Data Modelling Needs To Be Done To Ensure That The Information System Generated Later Can Function Correctly And Appropriately, In Accordance With The Requirements Of The Organization That Uses It.

**Data Model**

The Result Of Data Modeling Is The Data Model. A Data Model Is An Abstract Model (Meaning Parable Or Analogy) That Represents And Describes The Relationship Between Data Elements On An Entity (Object) In The Real World.

For Example, When We Come Across Real-World Data Like The Following:
"A White Car Made In 2017, Owned By A Lecturer Named Muhammad Ali."
Then We Can Create A Model That Represents The Properties Of The Car And The Owner Following TheRelationship Between The Two:



The Appearance/Shape Of The Resulting Model Can Be Anything, But In Creating A Model We Have To Make Sure That The Main Characteristics Of The Model Are All There. Its Main Characteristic Is That A Model Should Be Able To Describe And Represent The Amount/Value Of Data Held By Its Entity And The Relationship Between Each Entity Involved.

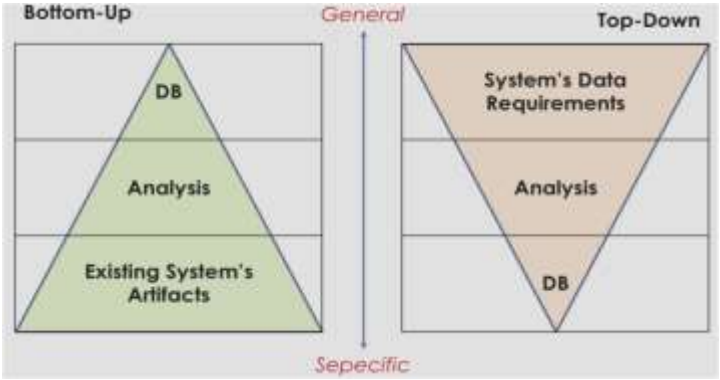
Based On The Order/Phase Of Development From Requirements To Actual Database, The Data Model Is DividedInto 3 Outlines:

**Conceptual Data Model (CDM)**
Contains An Overview Of The Data That Must Be Stored And Its Significance In The Business Processes Of An Organization. The Nature Of This Model Is Relatively Simple, Does Not Involve Technical Terms, And Can Be Understood By All Levels Of Management From Both IT And Non-IT Environments. One Of The Diagrams That Can Be Used To Represent This Model Is The Data Structure Diagram (DSD).

**Logical Data Model (LDM)**
Contains A More Detailed Overview Of The Entities Involved, Attributes, And Relationships Between Each Other. This Model Involves Entities, Attributes, And Relationships, And Begins To Use Technical Terms Related To The Business Processes Of The Organization. 1 CDM Can Require 1 Or More LDM. To Illustrate This Model We Can Use Entity Relationship Diagram (ERD)

**Physical Data Model (PDM)**
This Model Describes How Data Is Physically Stored On The Database. This Model Is Very Specific And Dependent On The Type/Brand Of DBMS Used. This Model Involves Tables, Columns, Primary Keys, Data Lengths. An Example Of A Diagram Used In This Model Is The EER Diagram In Mysql

In The Current Modelling Data There Are 2 Most Popular Approaches, Namely

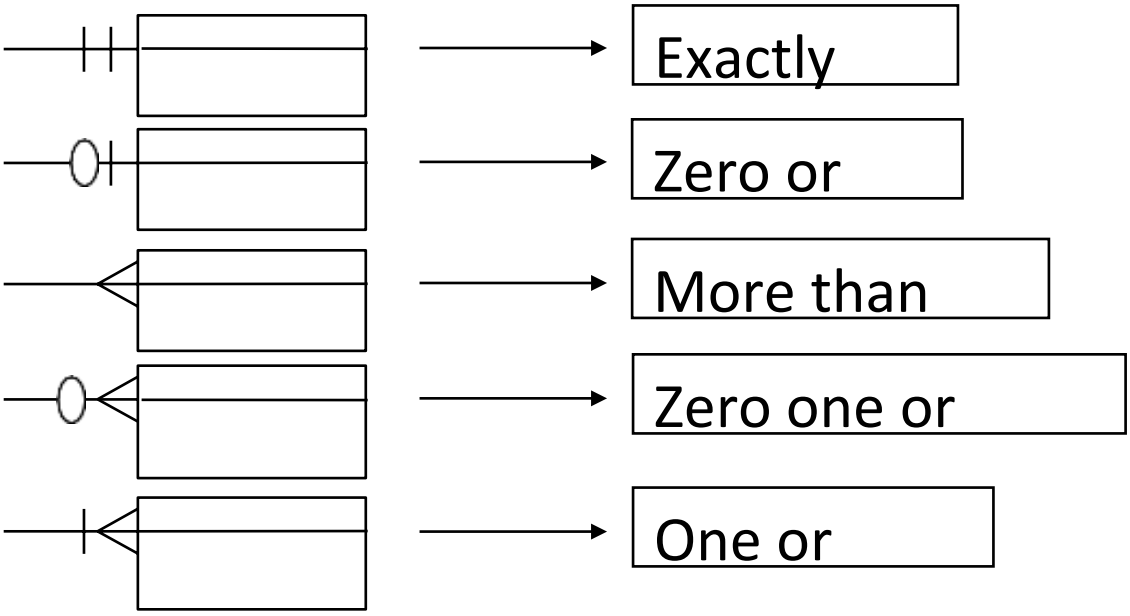



**Top-Down**
It Is An Approach That Moves From General To Specific. This Approach Is Well Used To Create Data Models On Entirely New Systems. In This Approach, Users Give An Overview Of The System And What Data Needs To Be Stored. The Analyst Then Elaborates (By Interviewing And Guessing) Further The Tables In The Database And ItsColumns.

**Bottom-Up**
The Opposite Of The Previous Method, In This Method Is Done Reasoning That Moves From Specific To General. This Approach Has Advantages When Used To Create Data Models Based On Pre-Existing Systems. In This Approach The User Indicates The System (Either A Manual Or A Computerized System) That Is Currently Running. The Analyst Then Examines All The Documents, Forms, Receipts, Reports, Ledgers, Etc. Involved In The System And Then Concludes The Database.

**ERD Version Of Martin**

In Addition To Chen's Version Of The ERD, There Is Also An ERD Version Of Martin That Is No Less Popular. In ThisERD There Are 5 Kinds Of Relationships, Namely:



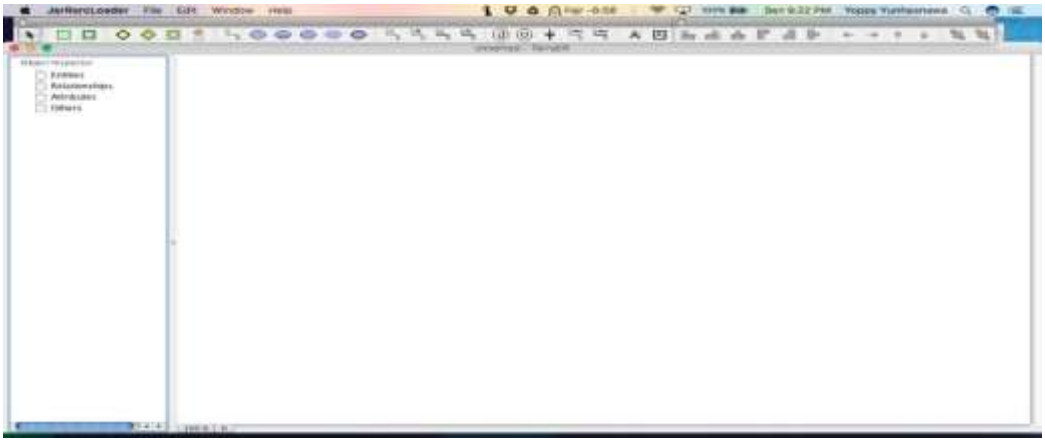
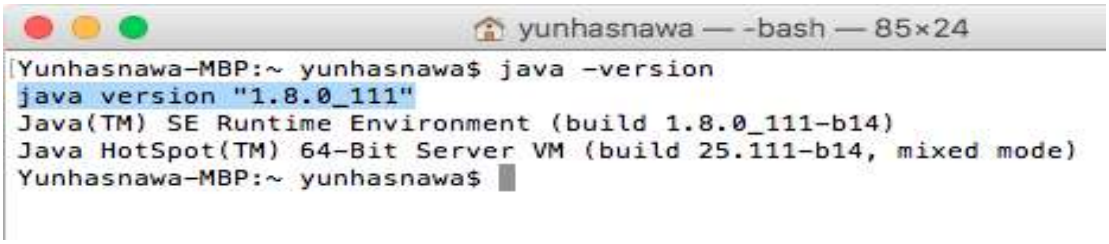
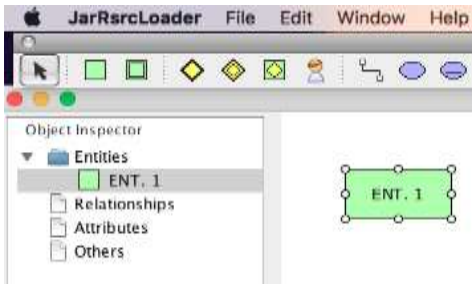
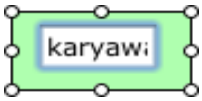
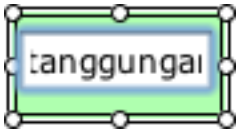

**CASE Tools For Creating Erds**

To Create An ERD We Can Take Advantage Of A Wide Variety Of Tools. There Are Many Tools That Can Be Used To Create An ERD And There Is No Absolute Reason To Choose A Particular Tool Over Other Tools. We Are Free To Use Any Tools That Are Suitable For Our Needs. In Fact There Is Actually No Need To Use Tools, If Enough We CanMake An ERD On Paper Or Whiteboard.

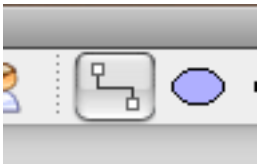
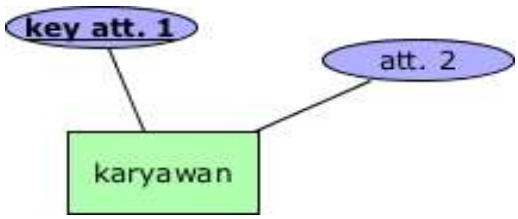
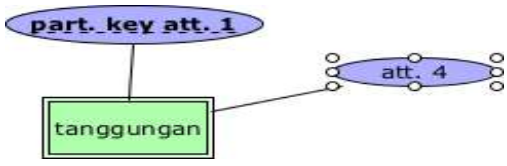
In This Practicum We Will Try To Use One Of The Tools To Create Chen Version Of ERD. The Tool Is Called Terraer. The Tools Were Chosen Because The License Is Open Source, Lightweight, And Easy To Use Anywhere As Long AsThere Is A JRE Installed.

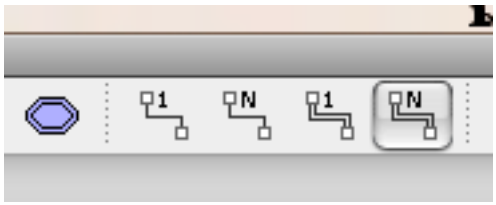
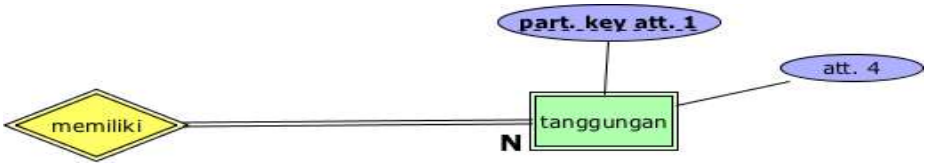
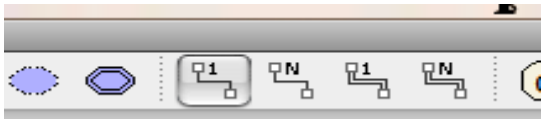
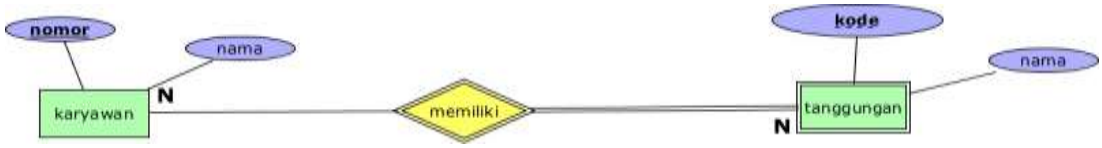
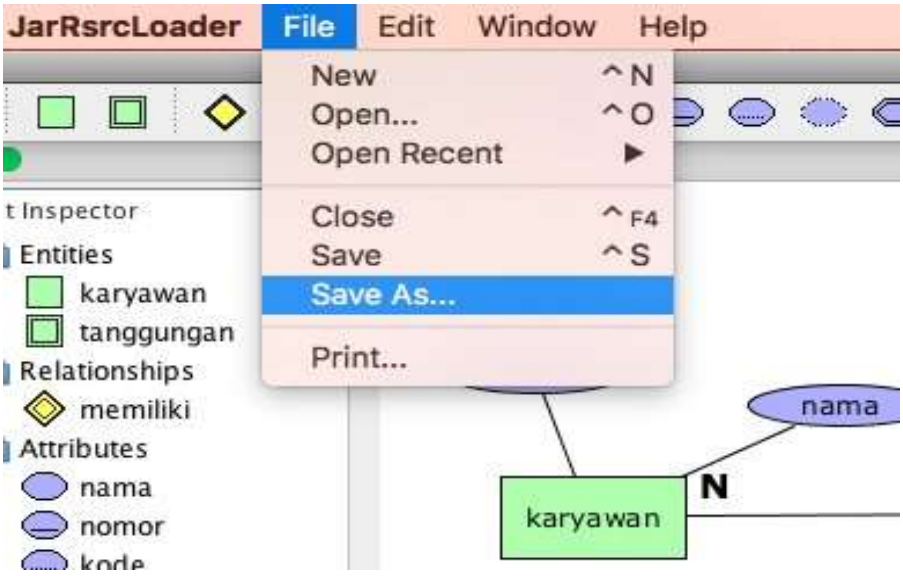
**Practicum – Part 1: Creating Chen's ERD With The Help Of Terraerd's CASE Tool**

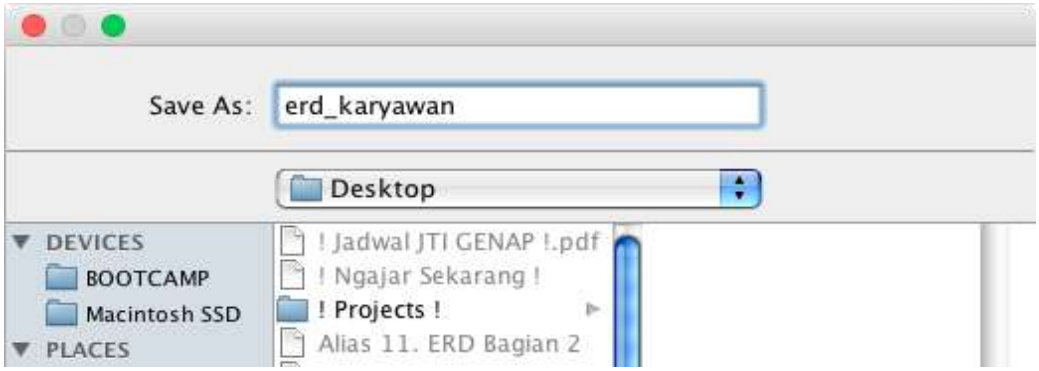
| Step | Description |
|---|---|
| 1 | Copy The File 'Terraer2.23.Jar' To Your Computer. Double-Click The File To Run It. If Successful, YouWill See A Screen Like The Following. |
| |   |

| | |
|---|---|
| |  |
| 2 | If You Can't Start It, Check Your Computer Whether It Has Java Runtime Installed. This Can Be Done By Opening CMD/Terminal And Typing The Command 'Java' Then Pressing Enter. If Java Is AlreadyInstalled, You Will Be Able To Find The Display Screen As Follows. |
| |  |
| 3 | If It Is An Error, Then First Install JRE On Your Computer. You Can Get A JRE From The FollowingPage:<br>Http://Www.Oracle.Com/Technetwork/Java/Javase/Downloads/Jre8-Downloads-2133155.Html |
| 4 | To Create An ERD On Terraer, We Use The Toolbar Located At The Top Of The Application Window. Create One Entity By Clicking 1x On The Green Square Icon And Then Clicking 1x Also On The Canvas(The Main Window Of The App. |
| |  |
| 5 | To Change The Entity Name, Double-Click On The Entity Symbol. Name The New Entity**'employee'.** |
| |  |
| 6 | Add Weak Entities In The Same Way That They Did To Add The Previous Entity. Click 2x And NameThe Entity With The Name**'dependents'** |
| |  |

| | |
|---|---|
| 7 | Add Identifying Relationships By Adding Rhombus-Shaped Symbols With Double Borders. |

| | |
|---|---|
| |  |
| 8 | Name The Relationship **'Have'.** |
| |  |
| 9 | To Add Properties/Attributes, We Use The Elliptical Symbols In The Middle Of The Top Panel. |
| |  |
| 10 | To Associate An Attribute With An Entity Or Relationship, We Use 'Attribute Connection' By ClickingOn The Following 1x Picture Icon: |
| |  |
| 11 | Then Click 1x On The Desired Attribute And Then Drag It To The Entity Or Relationship That Is TheOwner Of That Attribute.<br>Add 1 Key Attribute And 1 Simple Attribute. Then Connect The Two With The Strong EntityEmployees We've Created Before. |
| |  |
| 12 | Add 1 Partial Key Attribute And 1 Simple Attribute To The Dependent Weak Entity In The Same Way As Before. |
| |  |
| 13 | To Connect The Entity With The Relationship We Use The Buttons On The Right Side Of The Top Panel.There Are 4 Kinds Of Connecting Lines:<br>- 1, For Relationship 1 To.... |

| | |
|---|---|
| | - N, For Many Relationships To....<br>- 1=, Total Participation For Weak Entities With A Relationship Of 1 To....<br>- N=, Total Participation For Weak Entities With Many To.... |
| |  |
| 14 | Set Up Weak Entities 'Dependents' With 'Have' Relationships Using 'Total Participation N'. Click The Icon Above 1x, Then Click The 'Dependents' Entity And Drag It Towards The 'Have' Relationship. |
| |  |
| 15 | In The Same Way, Click The Usual Link Relationship '1 To...' And Connect The 'Employee' Entity WithThe 'Have' Relationship. |
| |  |
| 16 | Name All Attributes On Existing Entities So That They Are As Follows: |
| |  |
| 17 | To Save A Diagram That Has Been Created, You Can Do So By Accessing The File Menu  Save As... |
| |  |
| 19 | Save Your File With **The Name Erd_Karyawan**. |

| | |
|---|---|
| |  |
| 18 | Go To The **Tasks**section! |

**Task**

1. Save The ERD You Created Earlier Under Another Name. Then Modify And Complete The ERD With AllElements (*Entities, Attributes, Relationships*) Contained In The Following Top-Down Scenarios:

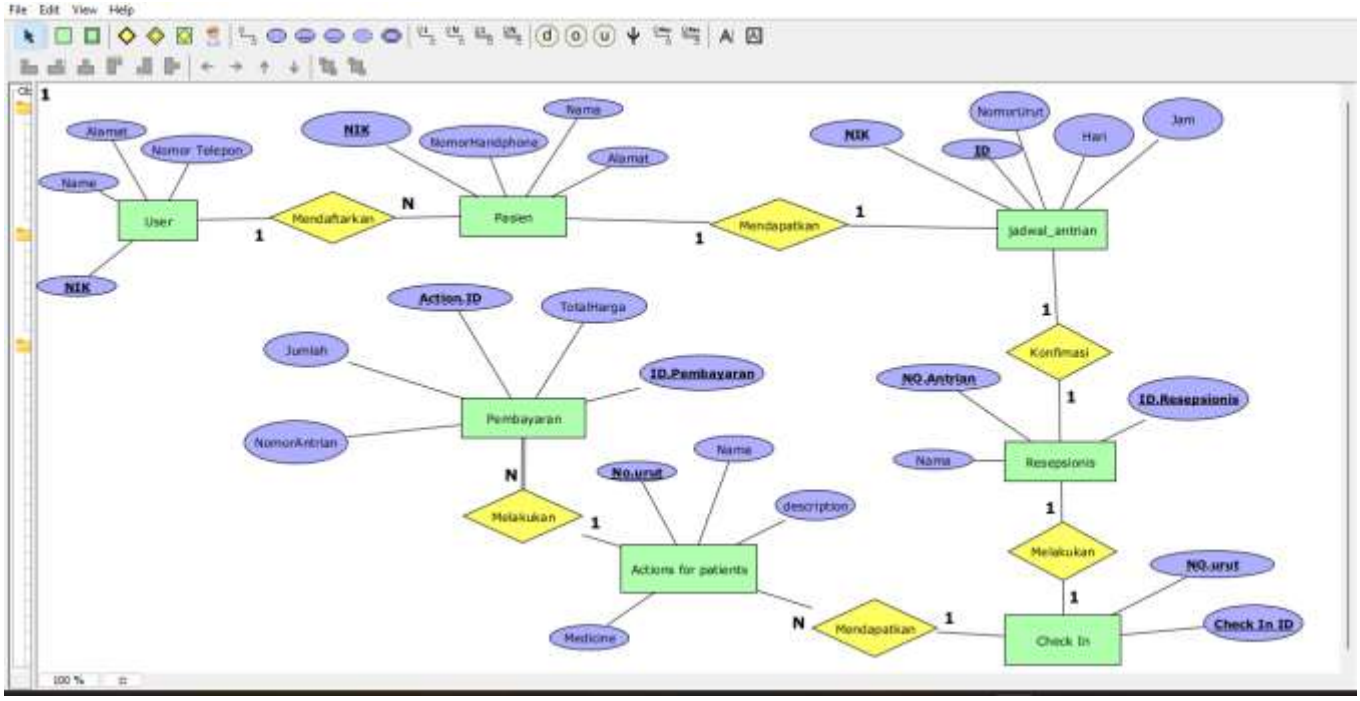
   *A Small Clinic In Malang Called Ahsana Operates 6 Days A Week. The Clinic Is Open From 07.30* Am *To 04.00 Pm. The More Days The Clinic* Is *Getting More And* More *Patients, But* It Is *Not Supported By* The Expansion *Of* Parking *Lots Because* Of *The Limited Land In A Fairly Densely Populated Area. There Are Also Pharmacies Selling* Herbal *Medicines.*

   *Fatih Is* The *Son* Of The *Owner Of Theclinic, He Took The Initiative To Create A Patient Queue System For The Clinic. The Queue* System *Is Useful* To *Minimize Waiting Visitors So As To* Have *An Impact On* The Adequate *Capacity Of Patient Vehicles In The* Parking *Lot. When The Queue System* Is *Finished,* A *User Is Required To* Register Themselves *First. The Data Filled In Is NIK, Name, Address,And* Mobile *Number. After Registering Personal Data,* The *User Enters The Patient's Data To Be Treated. The Patient* Data *Is NIK, Name, Address,And* Mobile *Number. A User Can Enter More Than One Patient Data. Furthermore Users Can Select* The *Queue Number On* A *Specific Schedule For Each Patient. The Selected* Schedule *Is Day,Hour, And Sequence Number.*

   *Once The Schedule* Is *Selected, The Patient Must Arrive At* A *Time That Corresponds To* The Respective *Schedule. When It Comes To* The *Clinic,* The *Patient Goes To* The *Reception To Do A Check In As Confirmation That The Queue Owner Has Arrived. The Receptionist Marks The Sequence Number Of The Queue* That *Has Been Checked In. Next The Patient Waits* For A *Call To Do Treatment.*

   *The Next* Process *Is* The *Patient* Goes *To The Cashier To Make The Payment. The Payment Covers The Payment* Of *Treatment As Well As Drugs Purchased If Any. Each Payment Item Consists* Of *The NameOf* The *Paymentitem,* The *Unit Price,* The *Amount,And* The Total *Price.*

   **ERD :**




**Entity :**

- **User**
- **Pasien**
- **Jadwal Antrian**
- **Resepsionis**
- **Check.In**
- **Action**
- **Pembayaran**

**Atribut :**

- **User**
  - **NIK (PK)**
  - **Nama**
  - **Alamat**
  - **No.Telp**
- **Pasien**
  - **Nik (PK)**
  - **Nama**
  - **Alamat**
  - **No.Telp**
- **Jadwal Antrian**
  - **Nik (Fk)**
  - **ID(Pk)**
  - **No.Urut**
  - **Hari**
  - **Jam**
- **Resepsionis**
  - **No.Antri (Fk)**
  - **Id Resepsionis (Pk)**
  - **Nama**
- **Check.In**
  - **No Urut (Fk)**

- **Check In ID (Pk)**

- **Action**
  - **No Urut (Pk)**
  - **Nama**
  - **Description**
  - **Medicine**
- **Pembayaran**
  - **Action.ID (Fk)**
  - **ID.Pembayaran(Pk)**
  - **Jumlah**
  - **Totalharga**
  - **No Antrian**

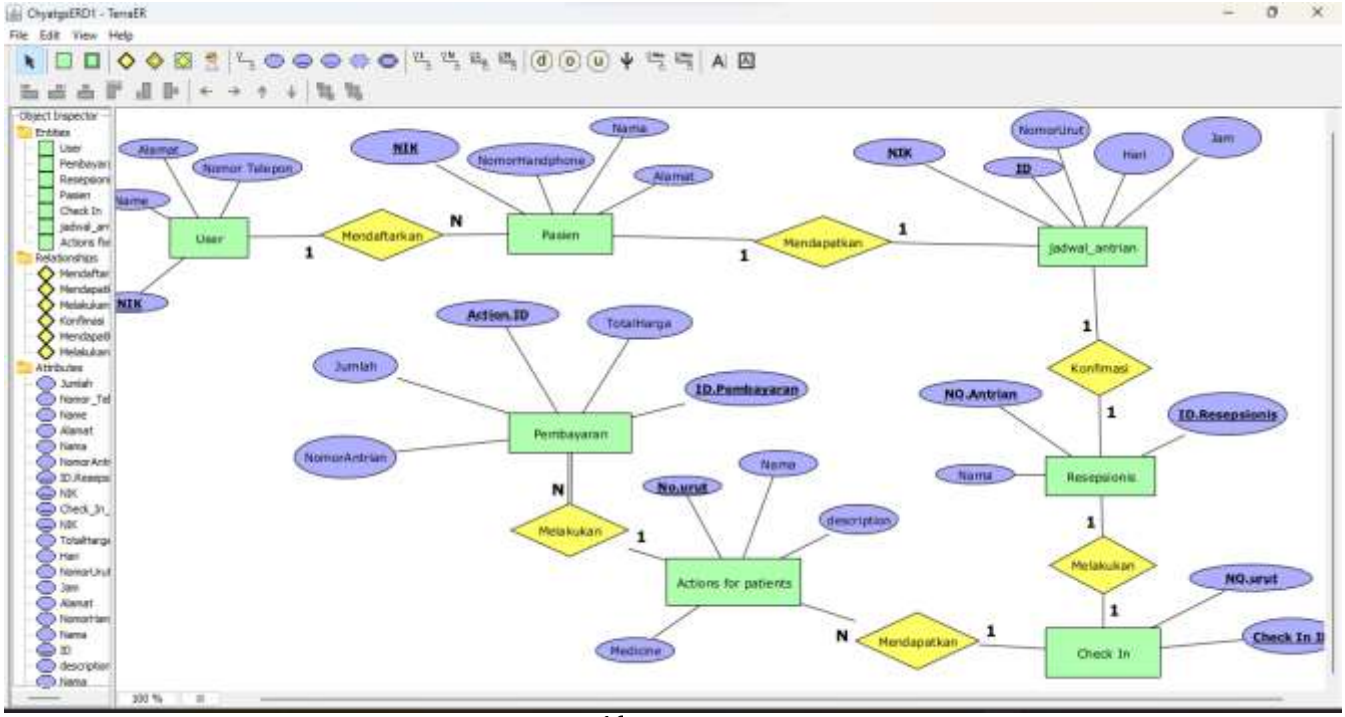
**Relasi :**

- **Users With Patients: Users Have Patient Data**
- **Patients With A Queue Schedule: Patients Have A Queue Schedule**
- **Queue Schedule With Prescription: The Patient Confirms The Schedule To The Prescriber**
- **Receptionist With Check-In: Marks The Patient's Schedule For Check-In**
- **Check In With Action On The Patient: The Patient Receives Action From The Doctor**
- **Action With Payment: The Patient Makes Payment**

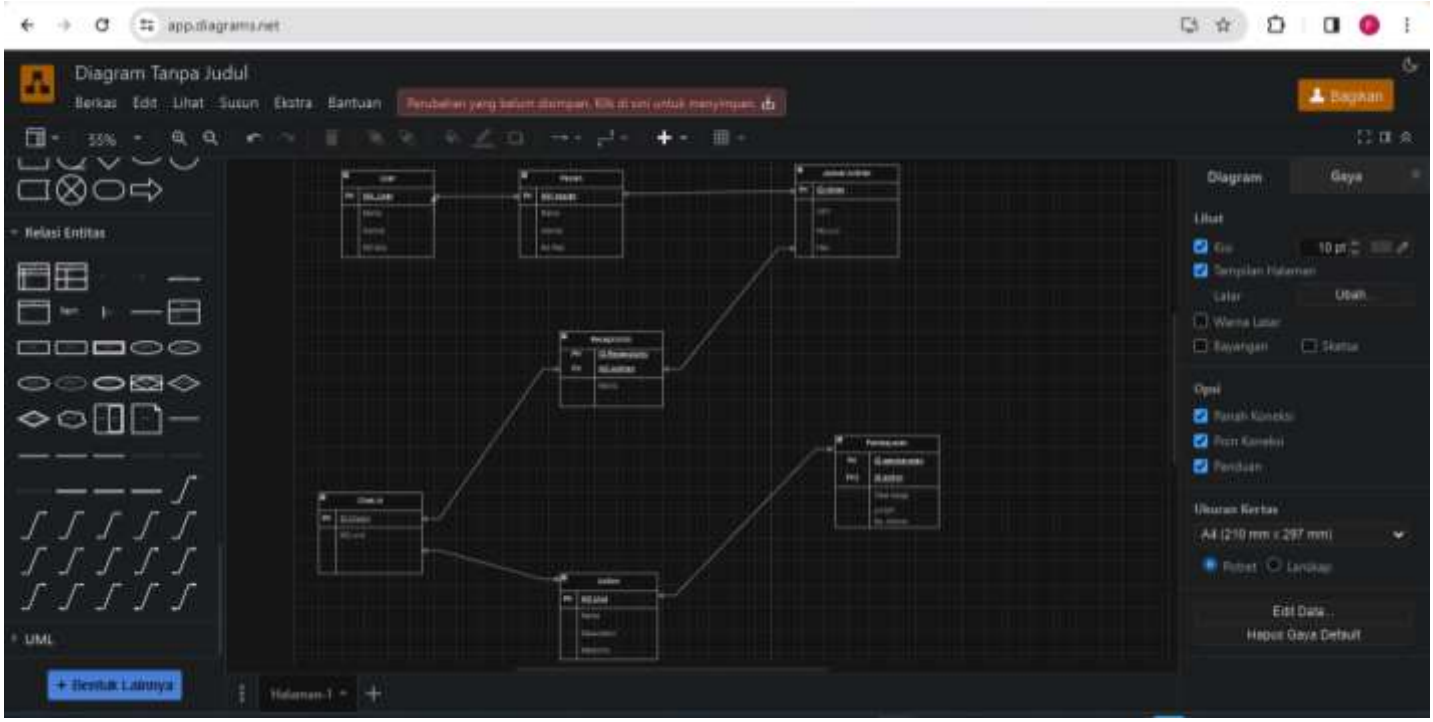
**Kardinalitas :**

- **Users With Patients: Users Can Have More Than One Patient Data (1:N)**
- **Patients With Queue Schedules: Each Patient Only Has One Queue Schedule (1:1)**
- **Queue Schedule With The Receptionist: The Receptionist Will Mark The Queue For Patients To Check In (1:1)**
- **Check In With Action On The Patient: Each Patient Will Receive Several Actions From The Doctor (1:N)**
- **Action With Payment: Each Patient Can Have More Than One Payment Item (1:N)**

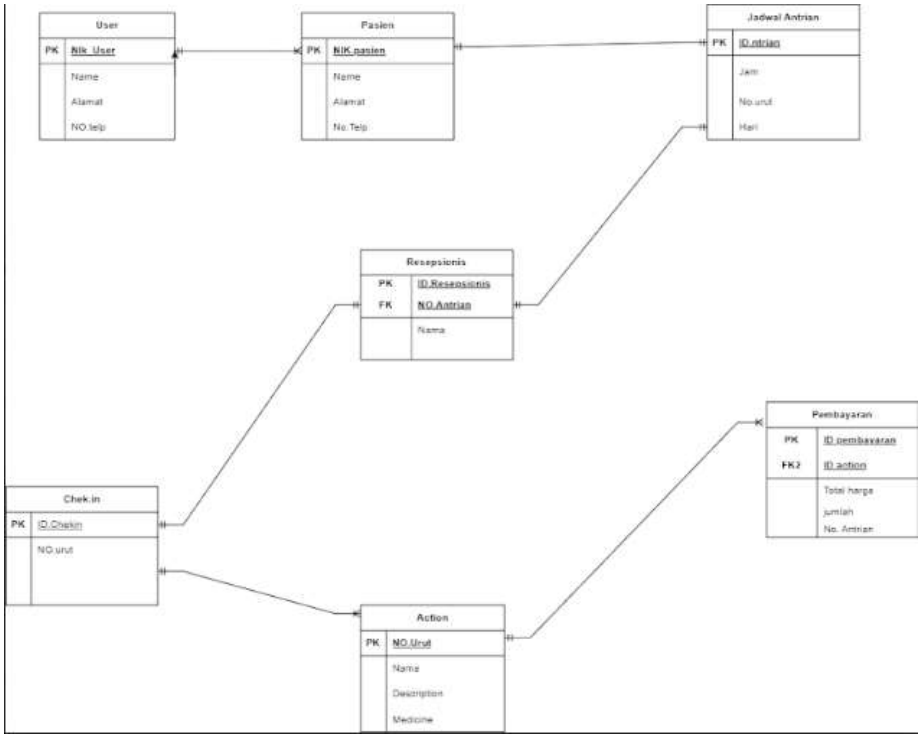
2. Look For *CASE Tools* That Can Be Used To Create Martin's Version Of ERD. *Any* Software Can Be ProvidedWith The Condition That It Must Be Free (Legal) Or *Open Source.* Let's Avoid The Use Of Illegal Software



**Here I Use Draw.Io To Create An ERD Diagram Because Draw.Io Is An Online Diagram Tool That Is Easy To Use, Free, And Supports Various Types Of Diagrams, Including Entity-Relationship Diagrams (ERD). Draw.Io Also Provides A Wide Selection Of Shapes And Symbols Needed To Create ERD Diagrams According To The Desired Notation. Additionally, Draw.Io Can Be Exported To A Variety Of File Formats, Making It Easy To Share And Save Diagrams Locally.**




3. Use The *Tools* You Installed Earlier To Create Martin Version Of ERD From Question Number 1




***-- Have A Good Work***

**–**