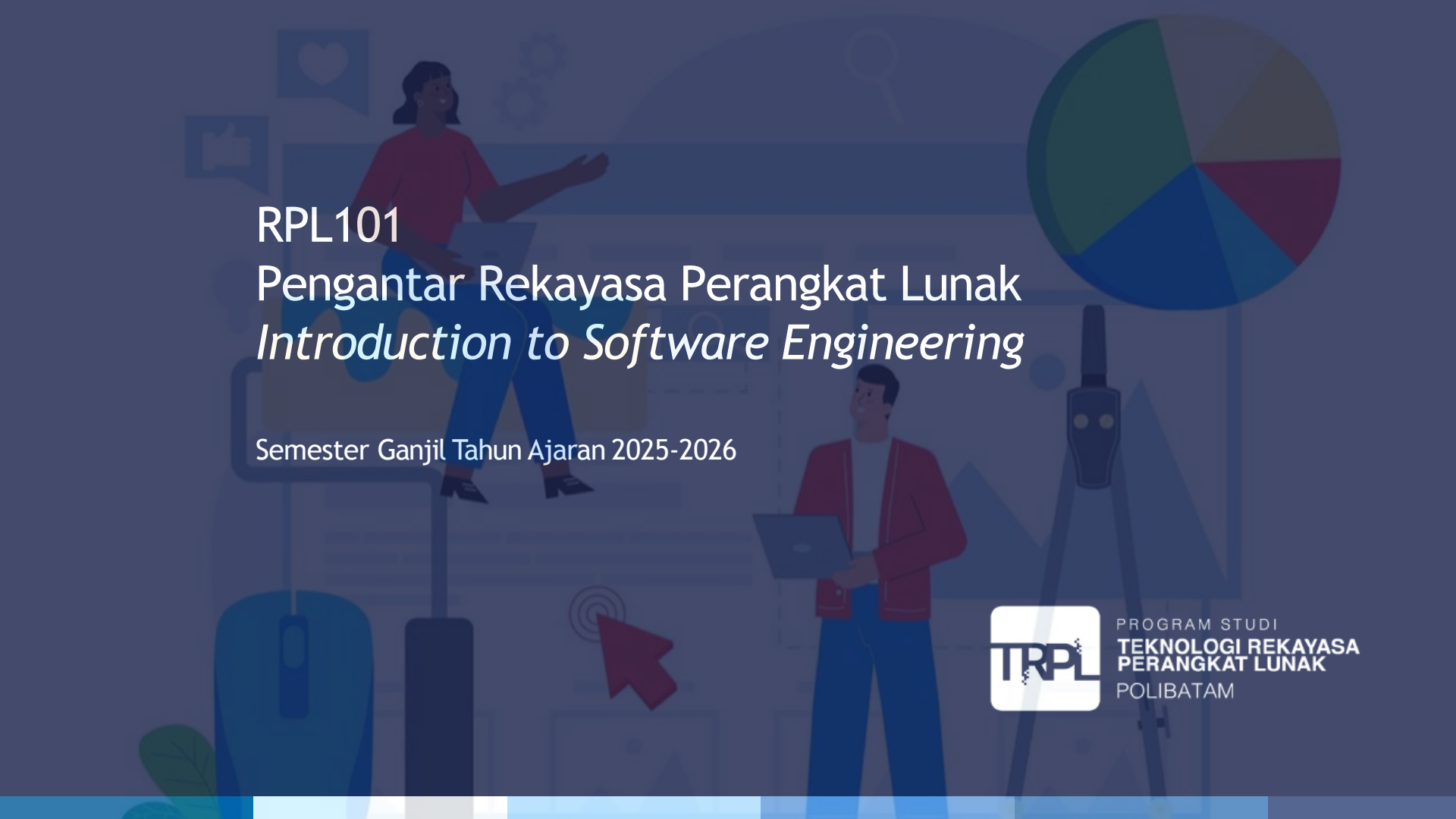

RPL101
Pengantar Rekayasa Perangkat Lunak
Introduction to Software Engineering

Semester Ganjil Tahun Ajaran 2025-2026

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TEKNOLOGI REKAYASA PERANGKAT LUNAK
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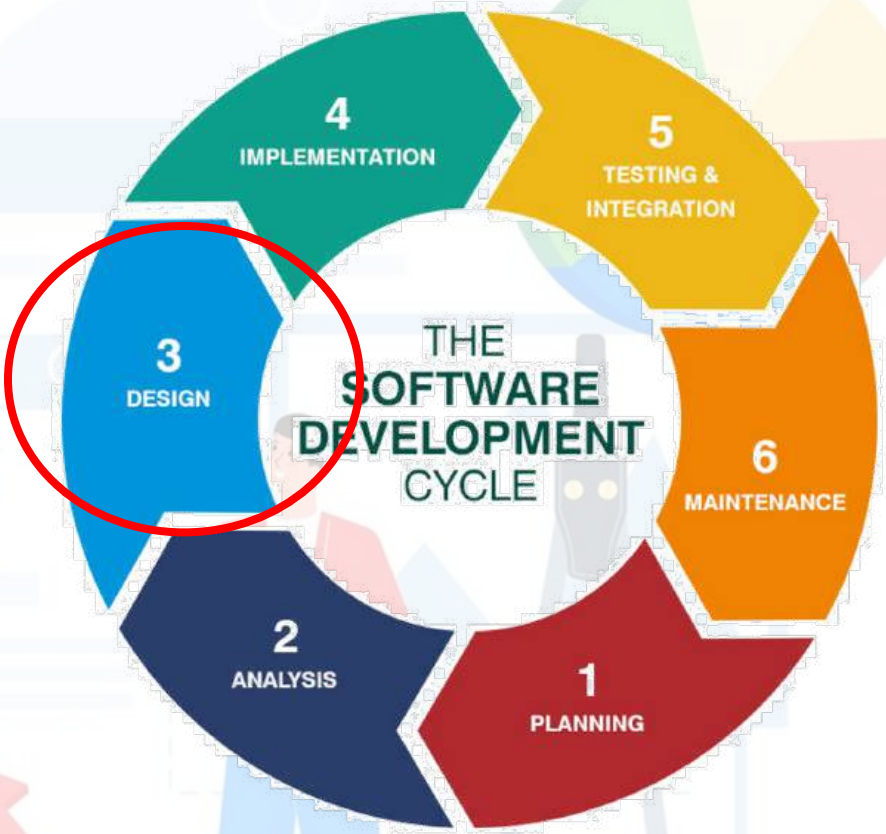
4. Desain
Design



Desain/Perancangan (*Design*)

Tujuan desain adalah untuk menghasilkan model atau representasi dari perangkat lunak yang akan dibangun. Desain perangkat lunak merupakan inti teknis dari rekayasa perangkat lunak dan pasti harus dilakukan tidak tergantung pada metode pembangunan perangkat lunak yang digunakan.

Menurut McGlaughlin, tiga karakteristik dari desain yang baik adalah:

- Desain harus mengimplementasikan semua kebutuhan/*requirements* yang telah diidentifikasi, dan harus meliputi semua kebutuhan/*requirements* yang diinginkan oleh stakeholder.
- Desain harus mudah dibaca dan dipahami, sebagai rujukan dalam membuat kode program dan melakukan pengujian.
- Desain memberikan gambaran yang lengkap, meliputi aspek data, fungsional, dan perilaku/*behavioral*.

Desain/Perancangan/*Design*

- **Desain arsitektur** mendefinisikan hubungan antar elemen struktural utama, style arsitektur dan patterns.
- **Desain antarmuka** mendeskripsikan bagaimana perangkat lunak berkomunikasi dengan sistem yang terhubung dengannya, dan dengan manusia yang menggunakannya.
- **Desain program** menerjemahkan elemen struktural dari arsitektur menjadi deskripsi prosedural bagian-bagian perangkat lunak.
- **Desain data** mendeskripsikan semua data dan stukturnya yang terlibat dalam perangkat lunak.

Desain Antarmuka

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Golden Rules

- Place the user in control

  Contoh: memberikan beberapa pilihan untuk melakukan interaksi, memberikan kesempatan pengguna untuk membatalkan aksi, dsb.

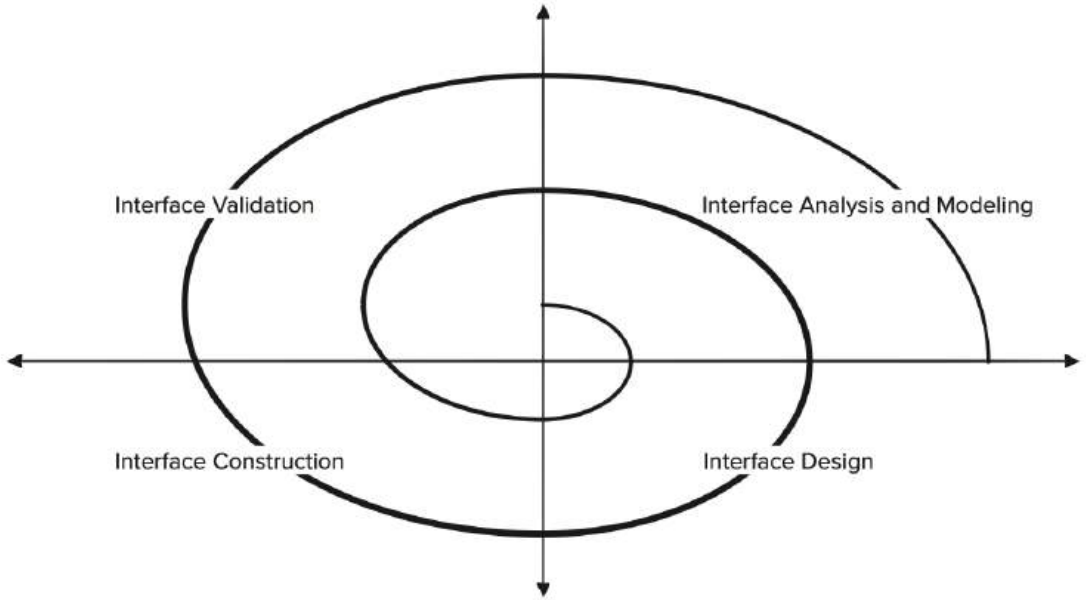
- Reduce the user's memory load

  Contoh: tampilan harus mencerminkan apa saja yang telah dilakukan oleh pengguna sebelumnya, memberikan *shortcut* untuk aksi yang sering dilakukan, dsb.

- Make the interface consistent

  Contoh: tampilan konsisten untuk perangkat lunak dalam satu kelompok, jangan mengubah sesuatu yang sudah standar, dsb.

Proses perancangan antarmuka



Interface Analysis

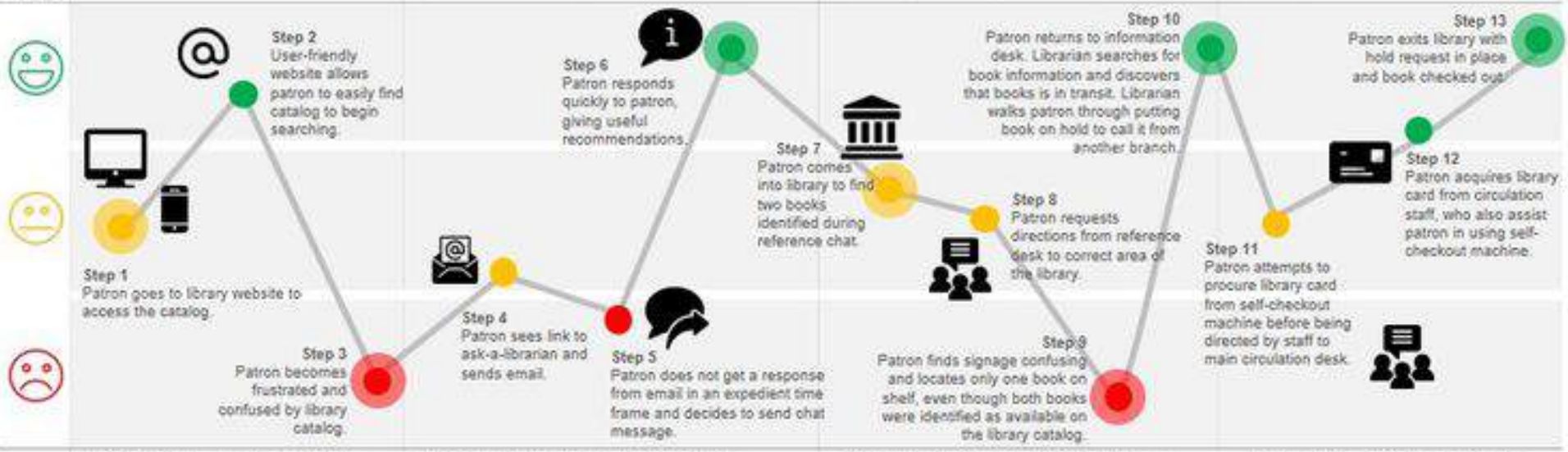
- Sebelum merancang antarmuka, harus mengenali dulu:

  (1) Pengguna (*end users*) yang akan berinteraksi dengan sistem melalui antarmuka, (2) aksi/tugas yang harus dilakukan oleh pengguna, (3) konten yang ditampilkan, an (4) lingkungan dimana tugas tersebut akan dilakukan.

- User research:
  - *Customer journey map* : menggambarkan tujuan dan rencana penggunaan perangkat lunak
  - *Persona* : representasi tujuan dan perilaku kelompok pengguna

Customer Journey Map: In Search of a Book

	PHASE 1: Initial Search	PHASE 2: Investigation	PHASE 3: Retrieval	PHASE 4: Completion
CUSTOMER EXPECTATIONS	• To find books on a desired topic.	• To identify specific books that will best suit needs.	• To easily locate (physically) desired material.	• To check out and exit with desired material
TOUCH-POINTS	• Library catalog • Library website	• Reference desk • Telephone reference interview • Email/Chat reference	• Library catalog • Reference desk • Library signage/building layout	• Circulation desk and self-checkout machine • Library card • Library signage
STAFF EXPECTATIONS	• To provide effective and user-friendly tools for patrons to find desired materials.	• To provide multiple and easily found points of access to reference assistance. • To work with patrons to pinpoint which materials are needed and desired.	• To clearly identify physical parts of library and stacks so that material is easily found. • Effective signage and book labels. • To display on catalog accurate book statuses.	• To provide easy-to-use checkout equipment. • To provide helpful support at circulation desks.



POINTS OF FAILURE	• Confusing or non-user-friendly library catalog, which frustrates patron and could have provided enough discouragement to cause patron to give up.	• Too long of a delay in responding to patron's reference email.	• Signage is confusing and creates difficulties in patrons being able to be self-directed to books. • Library catalog is out of sync with actual status of books, creating wrong information and frustrated patrons.	• Directions for self-checkout machine do not indicate that patron must see staff at main circulation desk to get library card. • There is a lack of signage about library card access at main circulation desk.

PERSONA

Shahnaz The Lecturer

"Done is better than perfect"

Age : 48

Education : Ph.D

Interest: Technology

Bio:

Shahnaz needs full-text articles for research and teaching. She needs expert support and likes digital technology with interactive information display methods. Her usual activities are browsing and downloading articles. She hopes to be able to get links. She is open to sharing, and for chat.

Frustation:

Slow access and no help

Abian The Student

" All our dreams can come true if we dare to pursue them"

Age: 22

Education: Bachelor

Interest: Modern devices

Bio :

Abian needs free articles for learning and research tasks with modern tools such as Digital technology with interactive information display methods. He wants to have a guide for using electronic resources or a workshop.

Frustration :

Paid articles and no full text

Cecilia The Research Assistant

"Do the best. "

Age : 32

Education: Master

Interest: Sightseeing

Bio :

Cecilia needs WoS-indexed article information for research that can be accessed through a smartphone with an interactive information display method, which can be quite fun when accessed from any device, anytime and anywhere.

Frustration :

Complex systems

Mark The Librarian

"Make things easier for others, and our affairs will be more accessible"

Age: 52

Education: Master's Degree

Interest: Reading

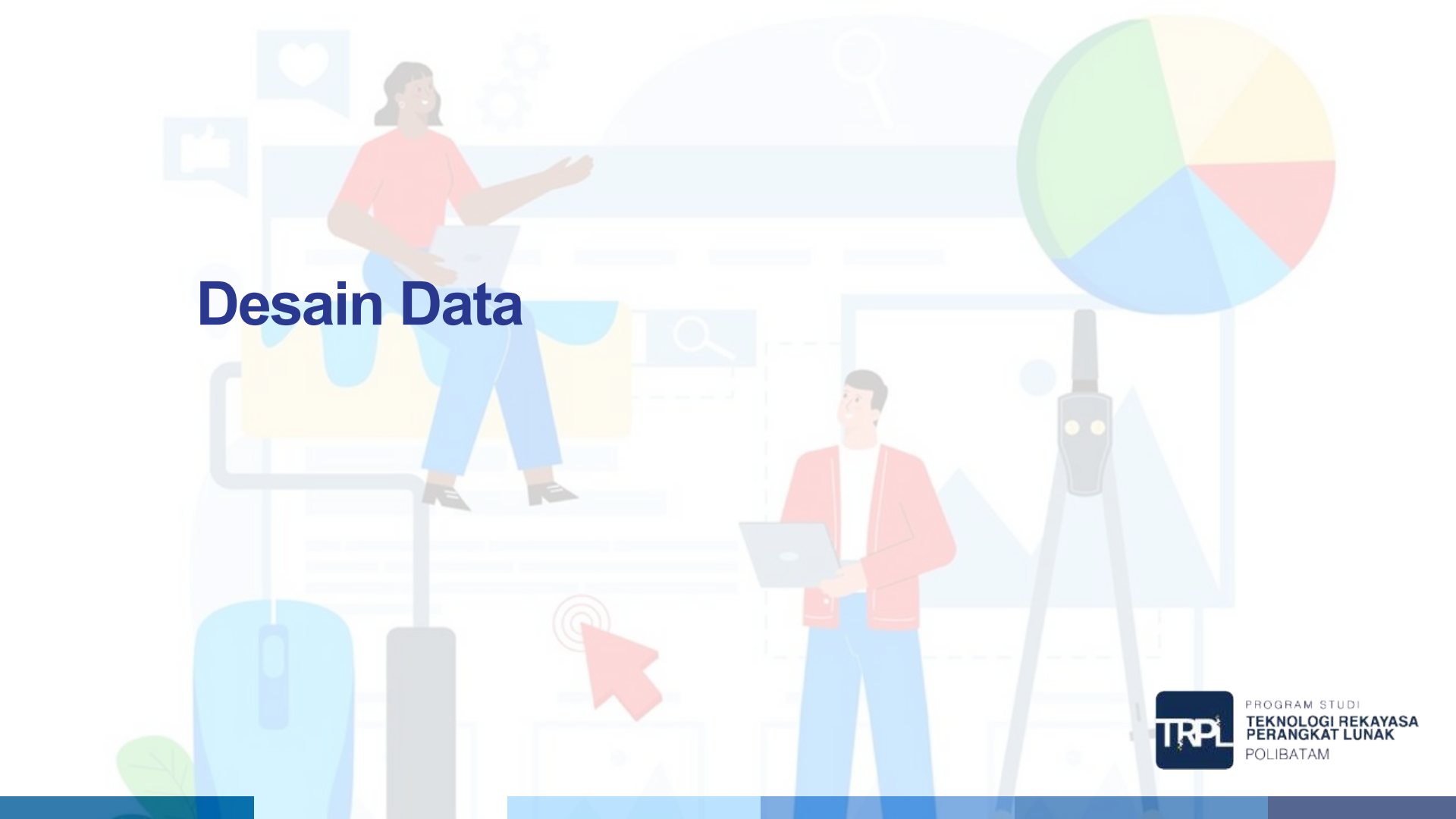
Bio:

Mark wants to help and guide users with effective methods despite his limited time. He also wants the University to subscribe to all subjects according to the university's knowledge. The only technology he needs is a smartphone with a mobile application information display to facilitate chatting with users.

Frustration: Lack of budget

Angelica, the Browsing Shopper	
"I like to take my time, do my research, and consider my options before buying"	
Knowledge:	Not familiar with, or superficial knowledge of the artists and music selections offered by Tune Source.
Tasks:	Arrives at the site with the intent to look around. Wants to explore a number of options and thoroughly research those options by looking at material and listening to samples. Wants to be able to save some selections to consider for a period of time before buying.
Interests:	Enjoys music. Has eclectic tastes. Not content with mainstream choices. Likes to own some out-of-the-ordinary music selections.
Characteristics:	Unhurried; deliberate; thoughtful.
Carl, the Hurry Up Shopper	
"I know what I want, and I want to buy it quickly"	
Knowledge:	Very familiar with the artists and music selections offered by Tune Source.
Tasks:	Arrives at the site with a specific purchase in mind. Wants to select the item quickly, pay for it quickly, and initiate the download immediately.
Interests:	May have studied music or work in some aspect of the music industry.
Characteristics:	Impatient; dislikes unexpected delays; expects things to work seamlessly.

Desain Data



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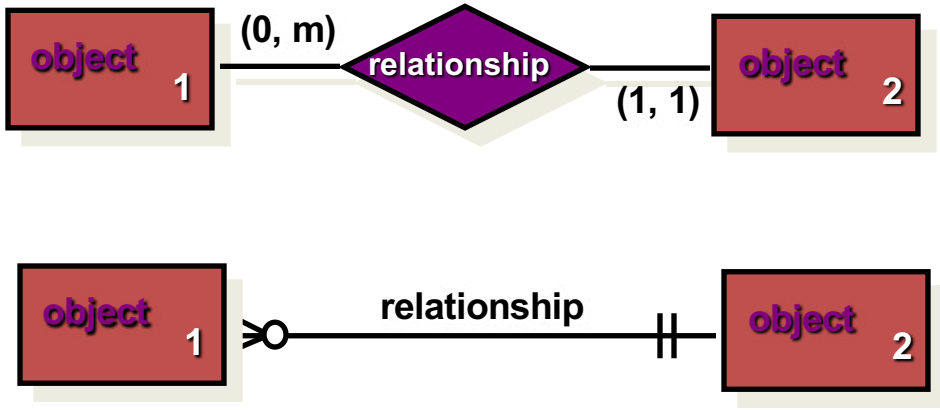
Pemodelan Data

- Melihat data, tanpa melibatkan pemrosesan
- Berfokus pada domain data
- Membangun model untuk merepresentasikan data
- Mengidentifikasi bagaimana data saling berhubungan

Objek data dan Atribut

- Sebuah objek data meliputi sekelompok atribut (dapat berupa aspek, kualitas, karakteristik, atau deskripsi objek)
- Objek data dapat saling berhubungan



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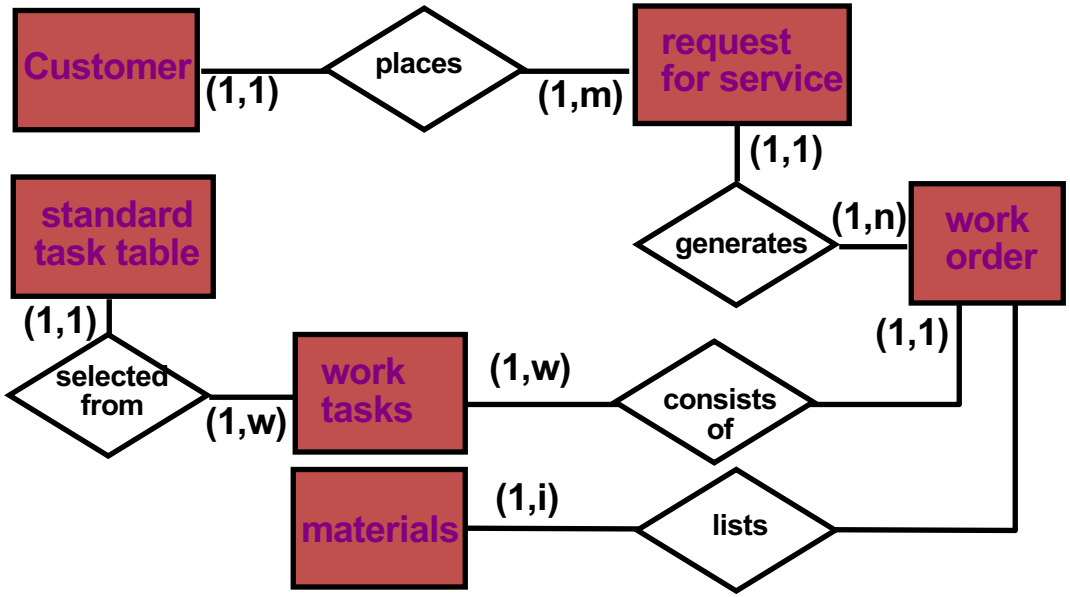
Contoh ERD:


Customer
(1,1)
places
(1,m)
request for service
(1,1)
generates
(1,n)
work order
(1,1)
standard task table
(1,1)
selected from
(1,w)
work tasks
(1,w)
consists of
(1,1)
materials
(1,i)
lists

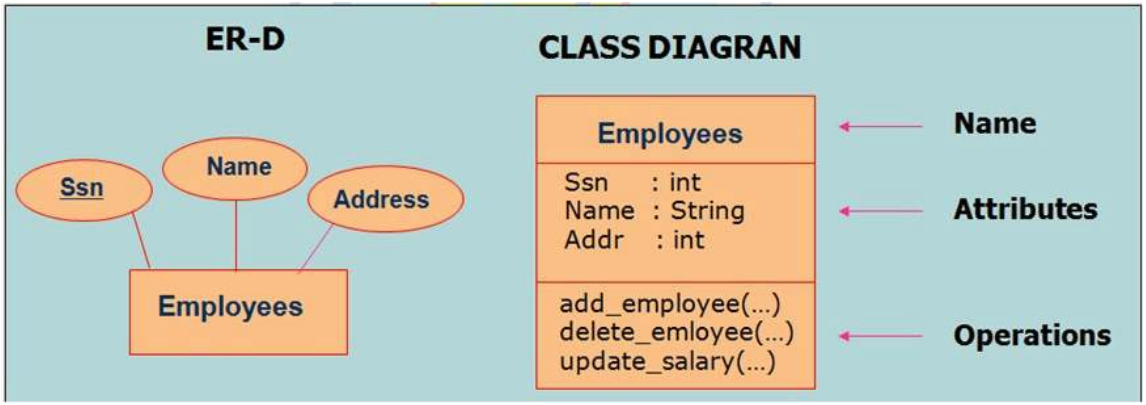
Pemodelan Berbasis Class

- Pemodelan berbasis class merepresentasikan:
  - Objek yang akan dimanipulasi oleh sistem
  - Operation (atau method atau service) yang akan dijalankan kepada objek untuk melakukan maanipulasi
  - Relationship antar objek
  - Collaboration yang terjadi antara class

Pemodelan Berbasis Class

- Atribut mendeskripsikan class, tergantung pada kebutuhan
  - Misal: class untuk pemain baseball professional
    - Untuk software statistik permainan: name, position, batting average, fielding percentage, years played, and games played
    - Untuk software dana pensiun: average salary, credit toward full vesting, pension plan options chosen, and mailing address.
- Operation dapat dibagi menjadi empat kategori:
  - Operation yang memanipulasi data (menambah, menghapus, menyeleksi, memformat)
  - Operation yang melakukan perhitungan
  - Operation untuk mendapatkan keadaan suatu objek
  - Operation yang memonitor sebuah objek atas terjadinya suatu event

ERD vs Class Diagram



Desain Program

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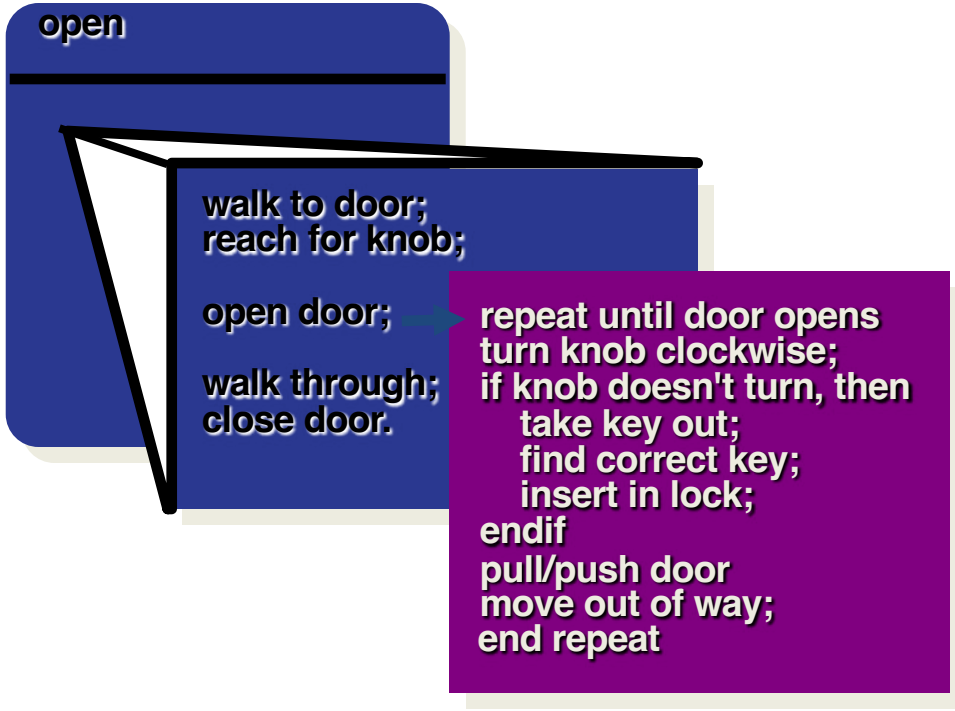
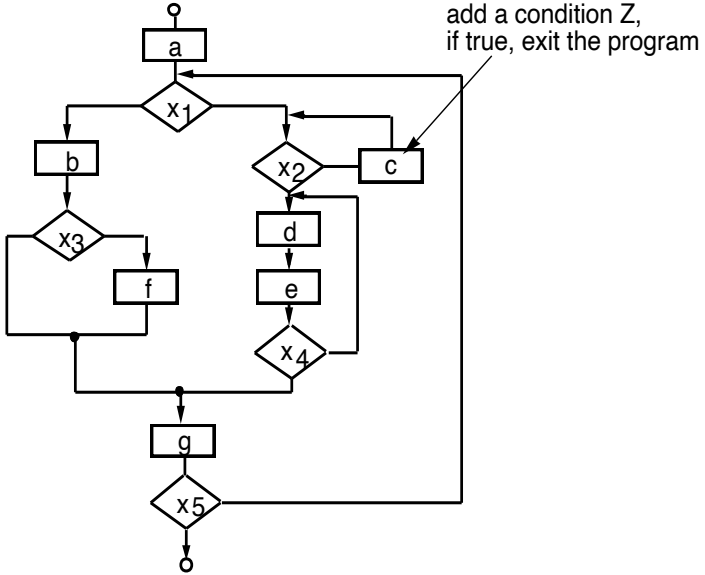
Desain Algoritma

- Aktivitas terdekat dengan coding
- Dimodelkan dengan:
  - graphical (e.g. flowchart, box diagram)
  - pseudocode
  - decision table



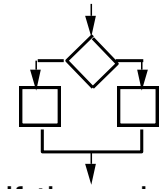
Pemodelan menggunakan flowchart



Pemodelan menggunakan decision table

Conditions	Rules 1	2	3	4	5	6
regular customer	T	T				
silver customer			T	T		
gold customer					T	T
special discount	F	T	F	T	F	T
Rules						
no discount	✓					
apply 8 percent discount			✓	✓		
apply 15 percent discount					✓	✓
apply additional x percent discount		✓		✓		✓

Pemodelan menggunakan pseudocode




```
if condition x
  then process a;
  else process b;
endif
```

Pemodelan UML

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Pemodelan Berbasis Objek

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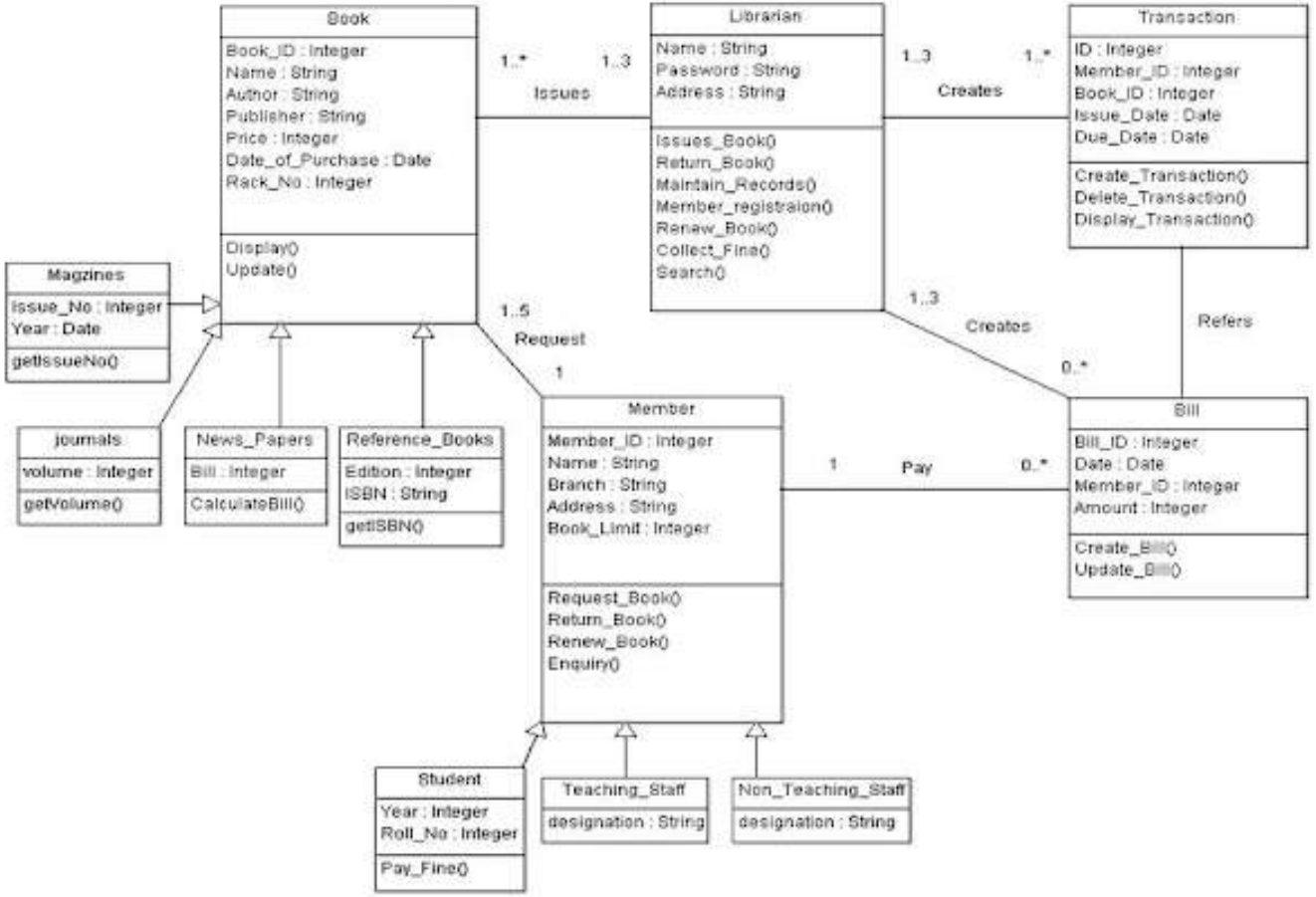
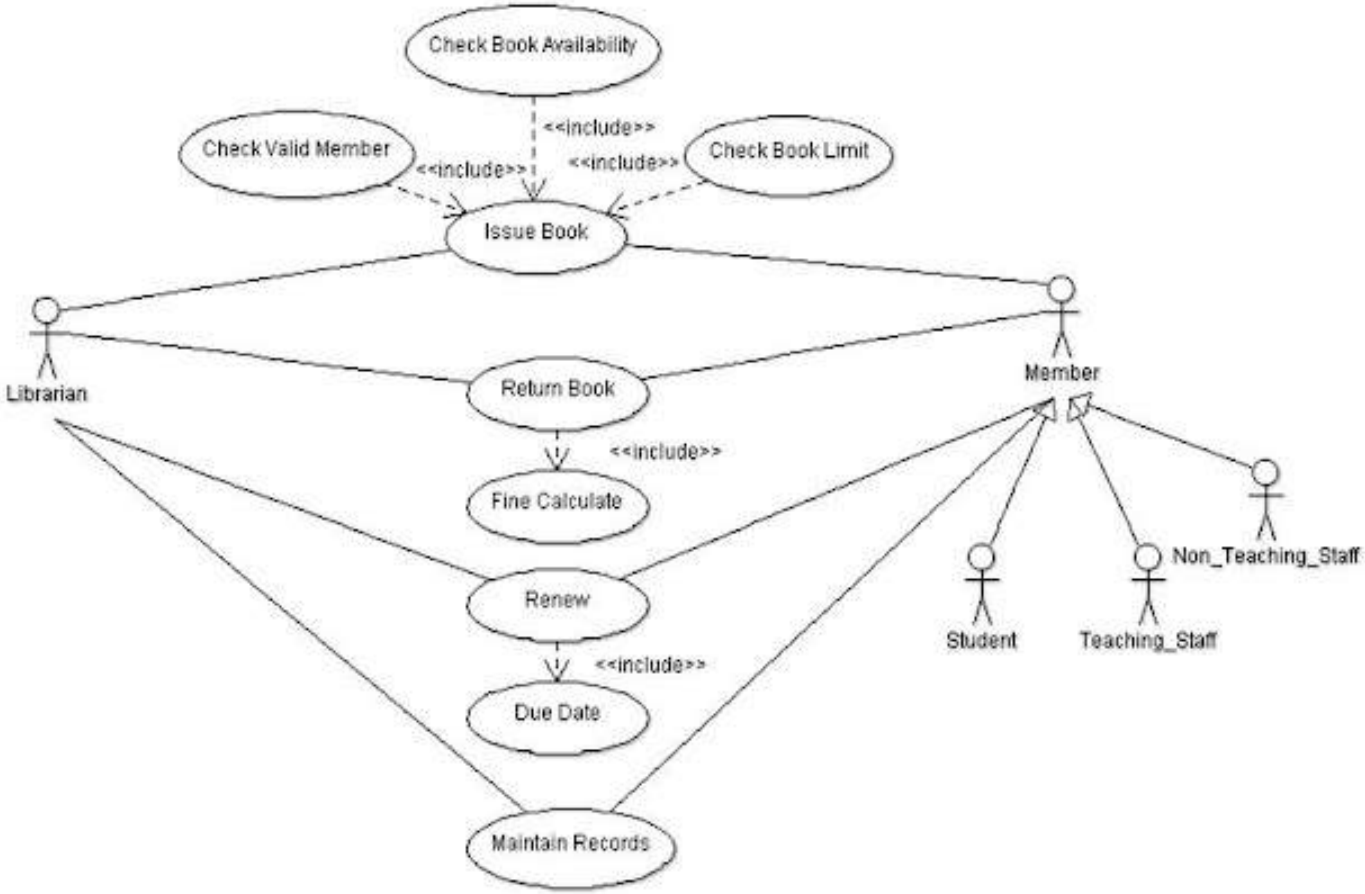
Dua jenis model dalam tahapan desain adalah:

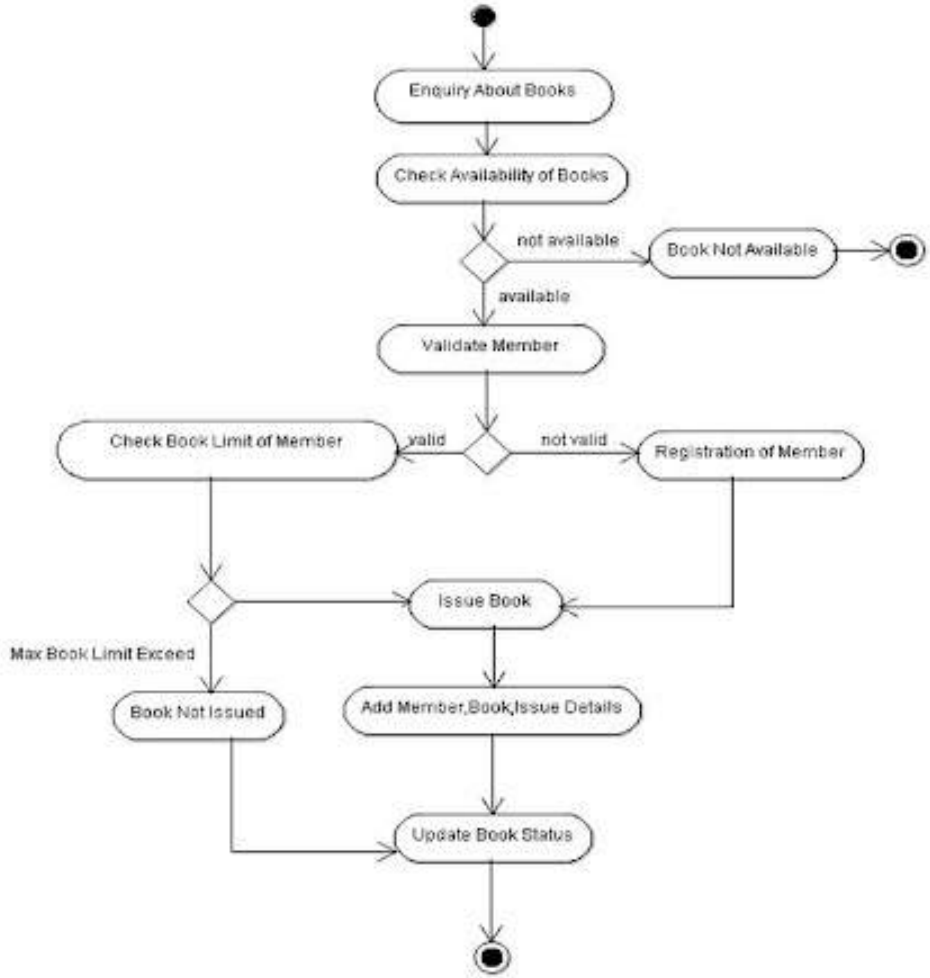
- Model struktural (*structural model*): class diagram
- Model fungsional (*fuctional model*): use case diagram, activity diagram, sequence diagram
- Model perilaku (*behavioural model*): activity diagram, state diagram



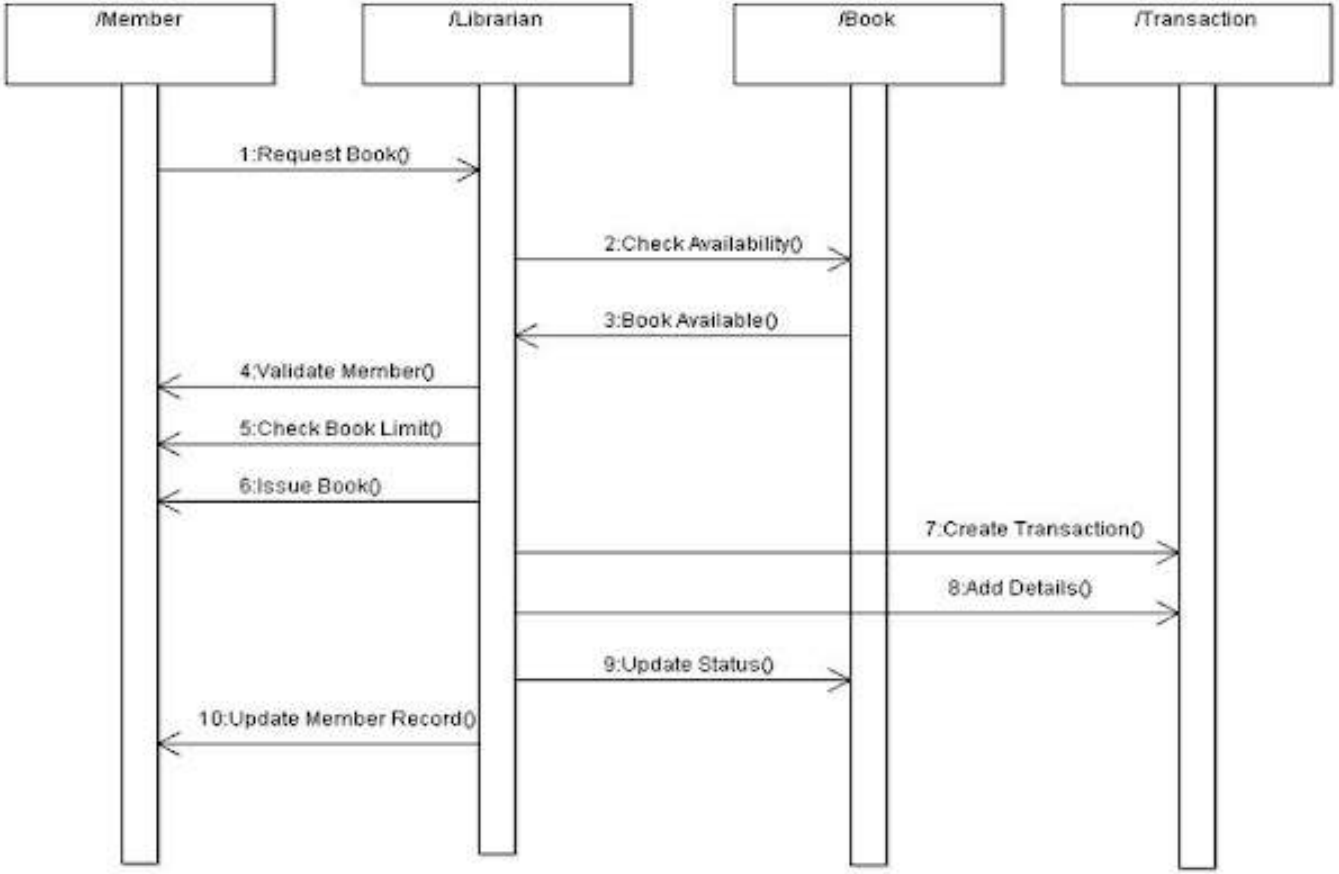
dig.Class Diagram for Library Management System



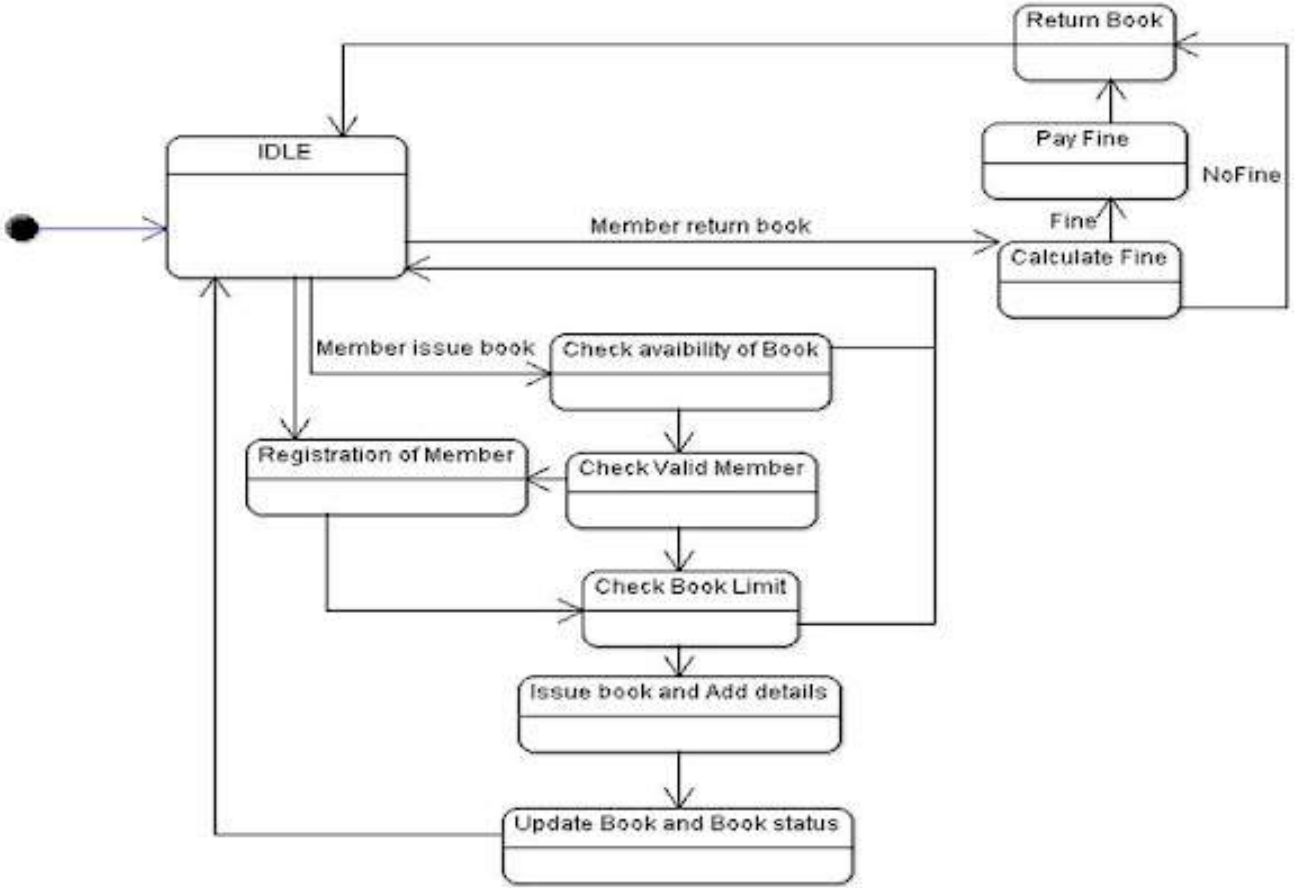
dig.Use Case Diagram for Library Management System



dig.Activity Digram for Issuing Book from Library



dig.Sequence Diagram For Issuing Book From Library



State chart Diagram for Issuing book from Library

Selesai. ☺