Software Engineering

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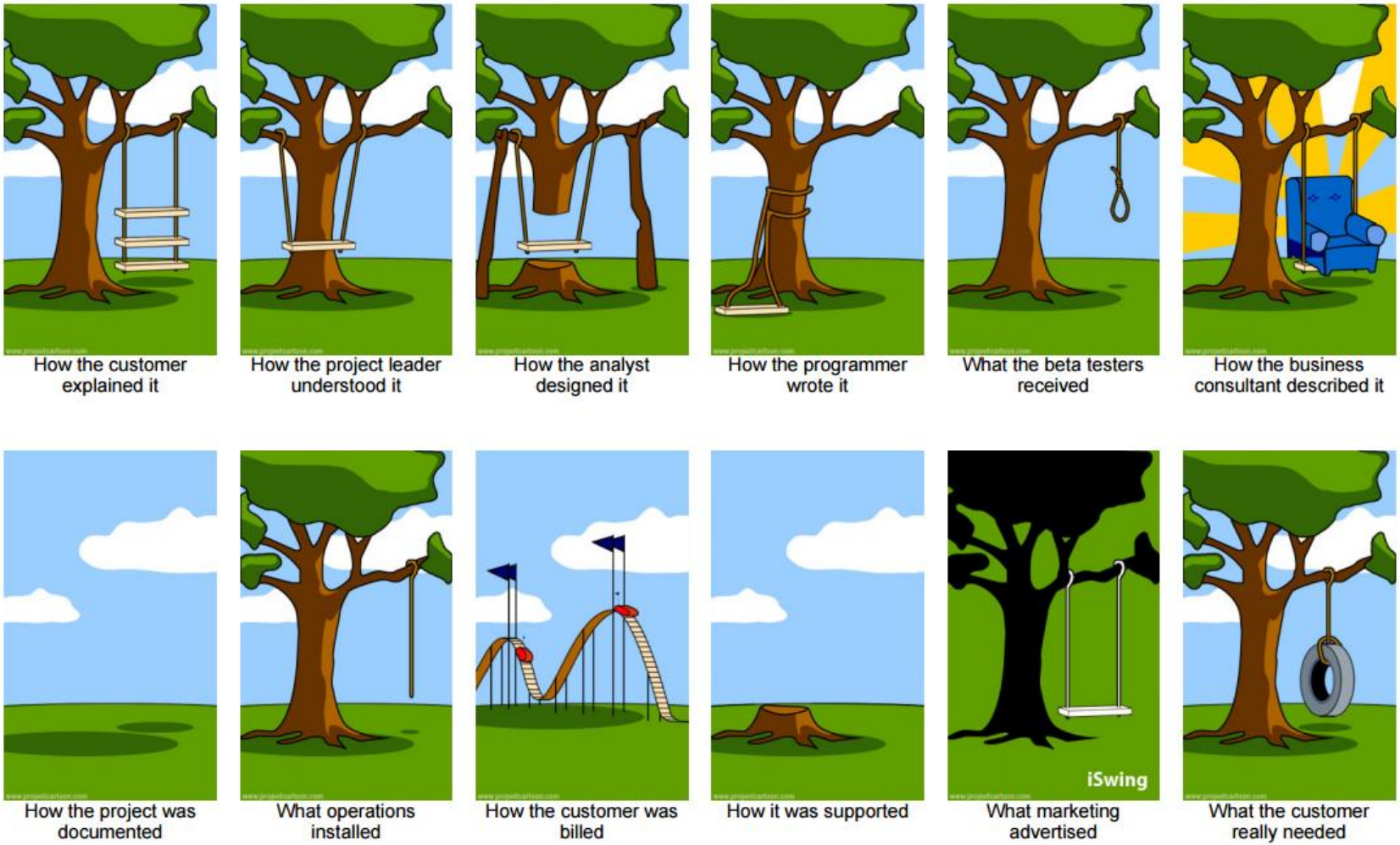
February 2022

Outline

1. Introduction
2. The Nature of Software
3. Software Engineering
4. The Software Process
5. Process Models
6. Agile Development
    1. XP
    2. Scrum
7. DevOps
8. Requirement Engineering
9. Software Modeling
10. Design Concepts
11. Umbrella Activities
12. Case Studies

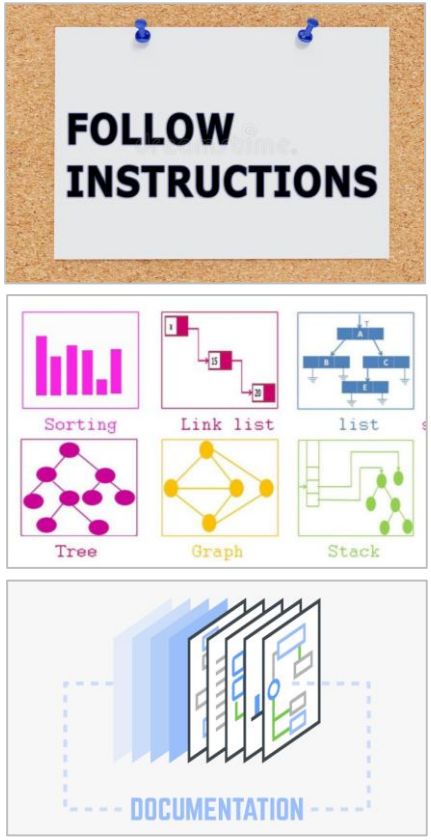
Introduction



What is Software?

Software is:

1. **Instructions** (computer programs) that when executed provide desired features, function, and performance;
2. **Data Structures** that enable the programs to adequately manipulate information and
3. **Documentation** that describes the operation and use of the programs.



What is Software?

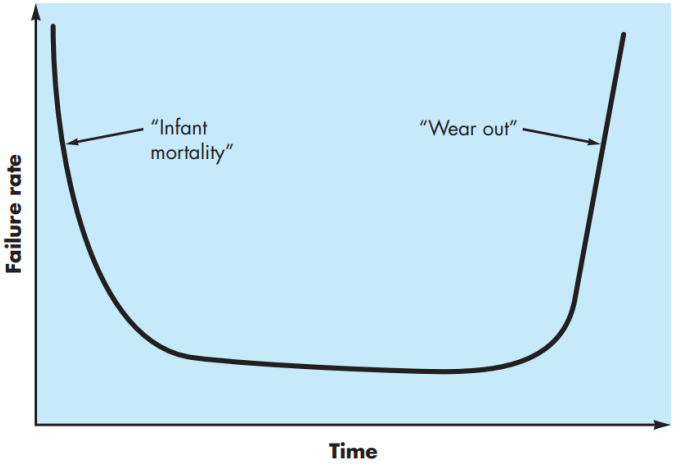
- Software is developed or engineered, it is not manufactured in the classical sense.
- Software doesn't "wear out."
- Although the industry is moving toward component-based construction, most software continues to be custom-built.

Component-based Design & Construction

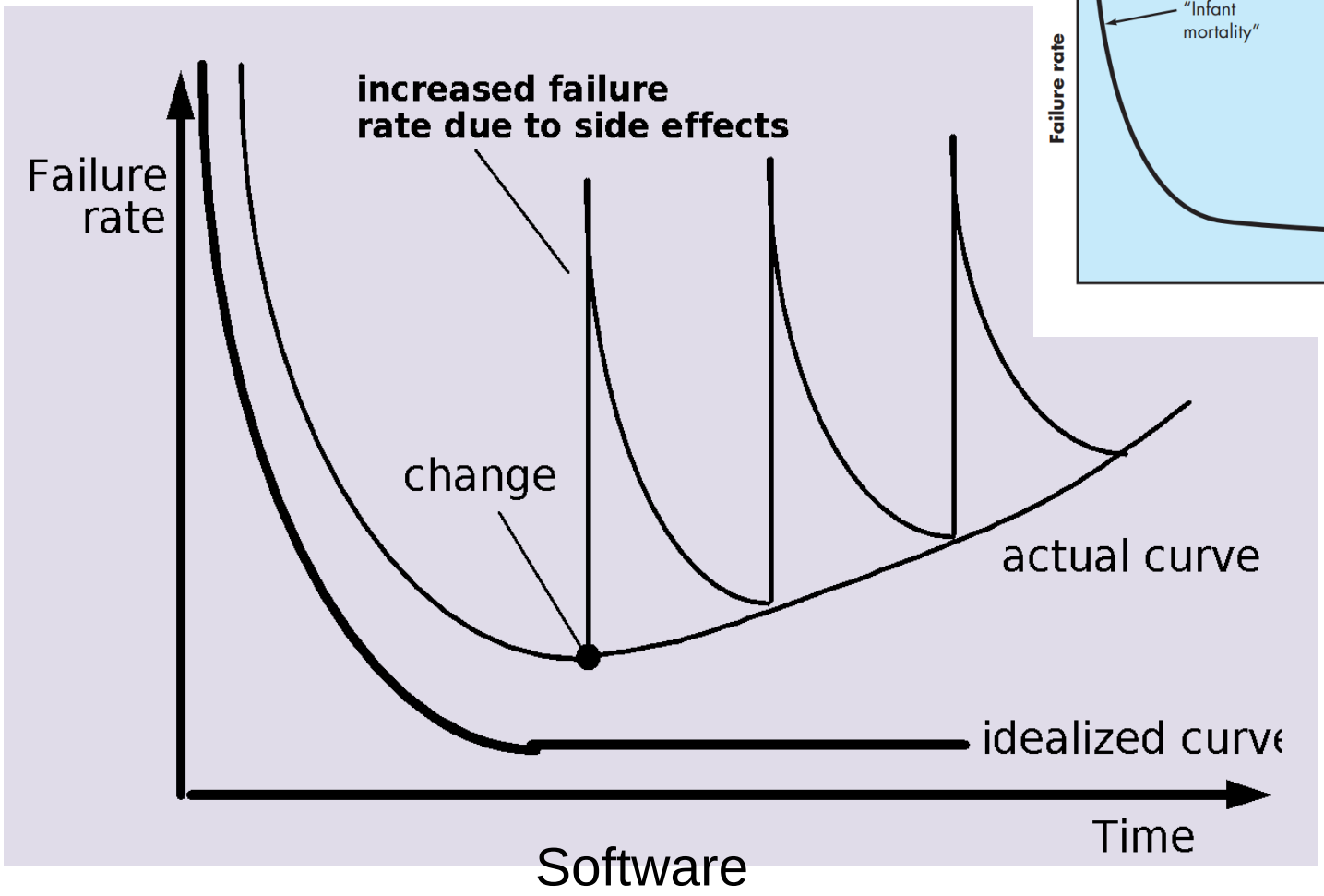
All components can be replaced or recovered:
Arms, arm caps, legs/feet, seats, backs, front panels

All Integra Seating designs have
Component-based Construction

Failure Rate



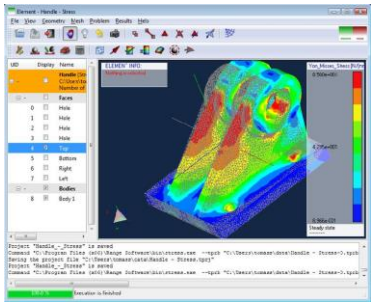
Hardware

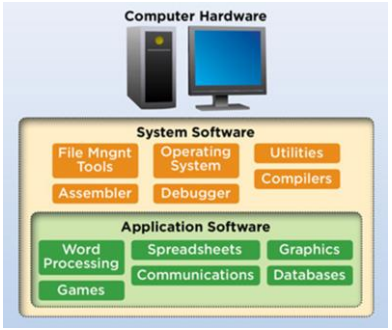


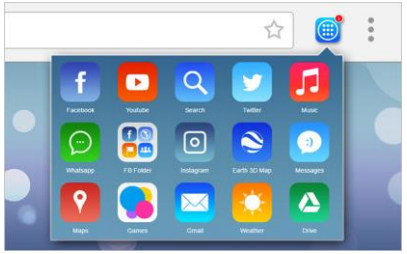
Software

Software Applications

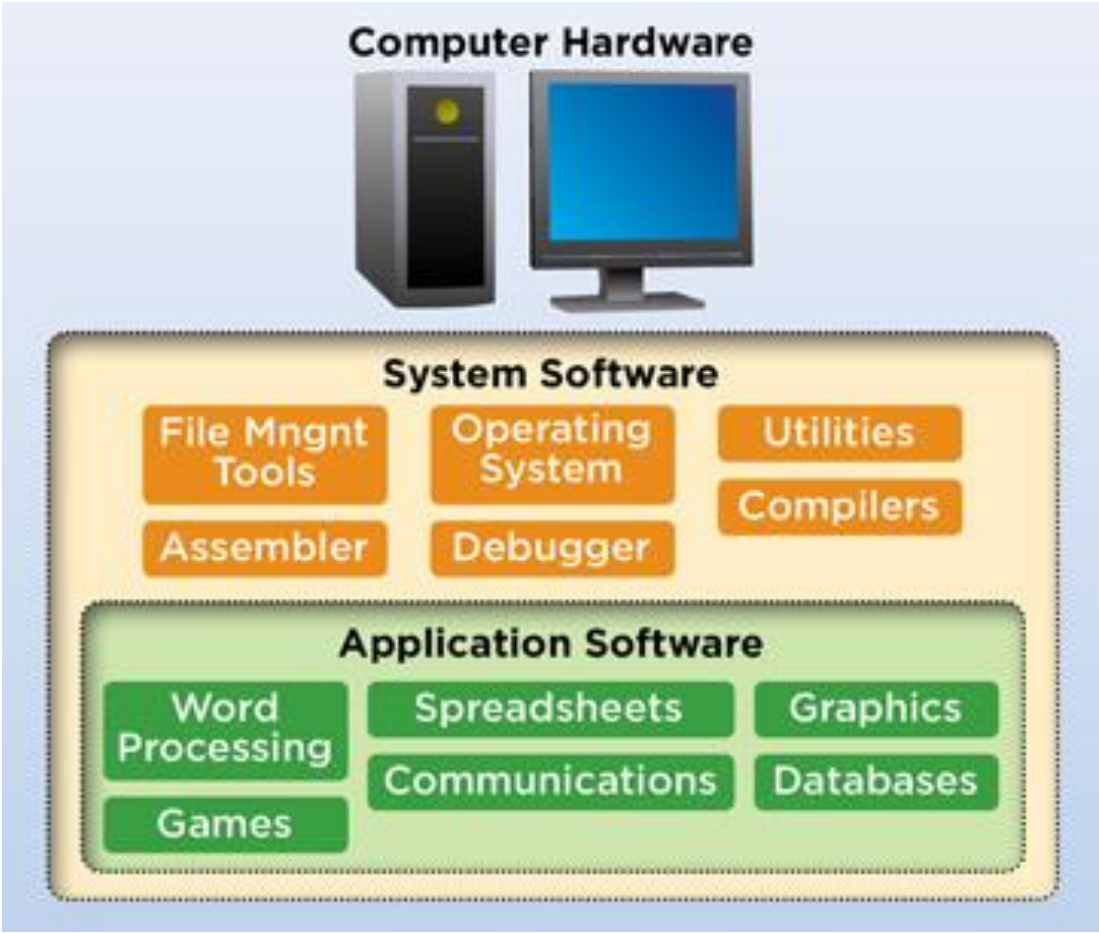
1) System Software
2) Application Software
3) Engineering/Scientific Software
4) Embedded Software
5) Product Line Software
6) Web/Mobile Applications
7) AI Software (Robotics, Game Playing)



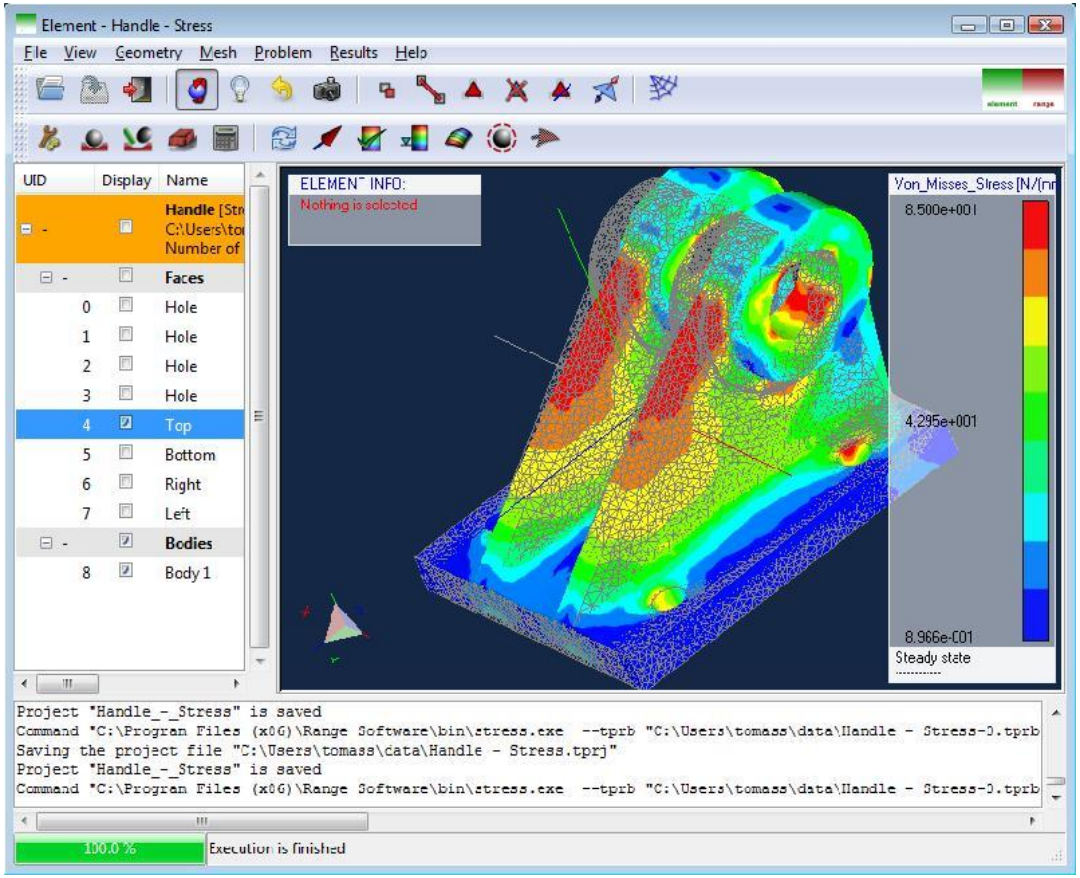




System Software and Application Software

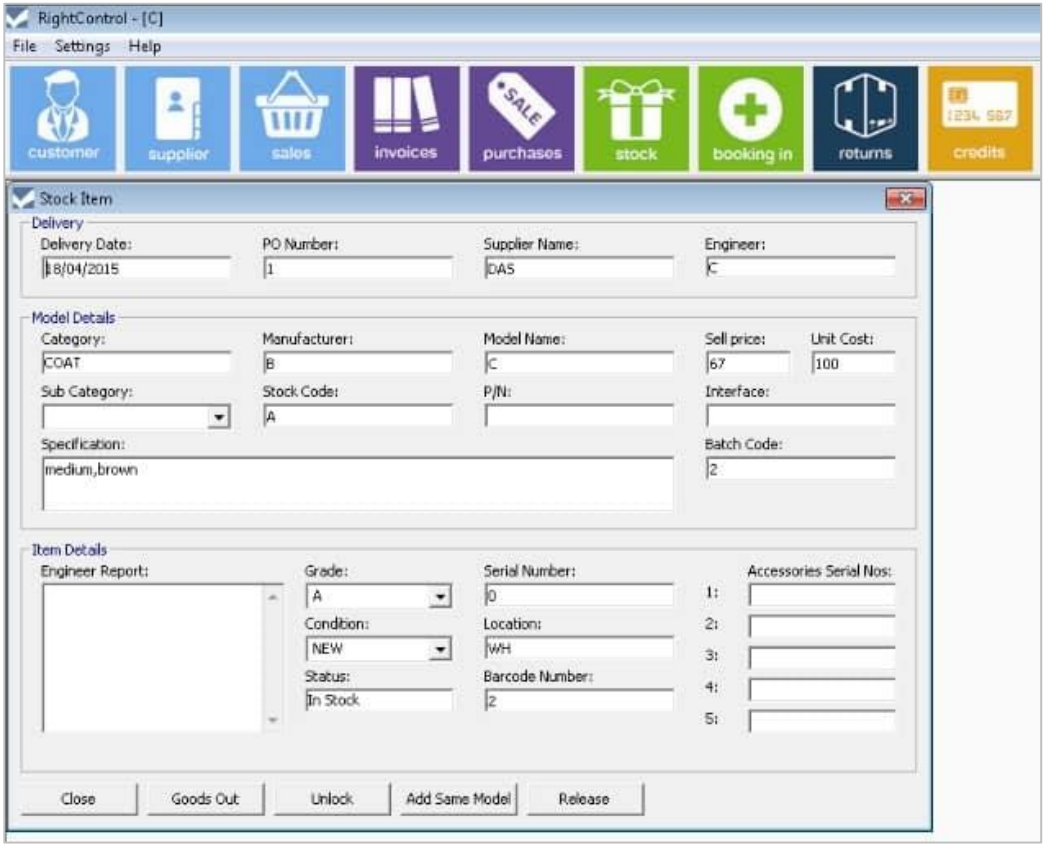


Engineering and Scientific Software

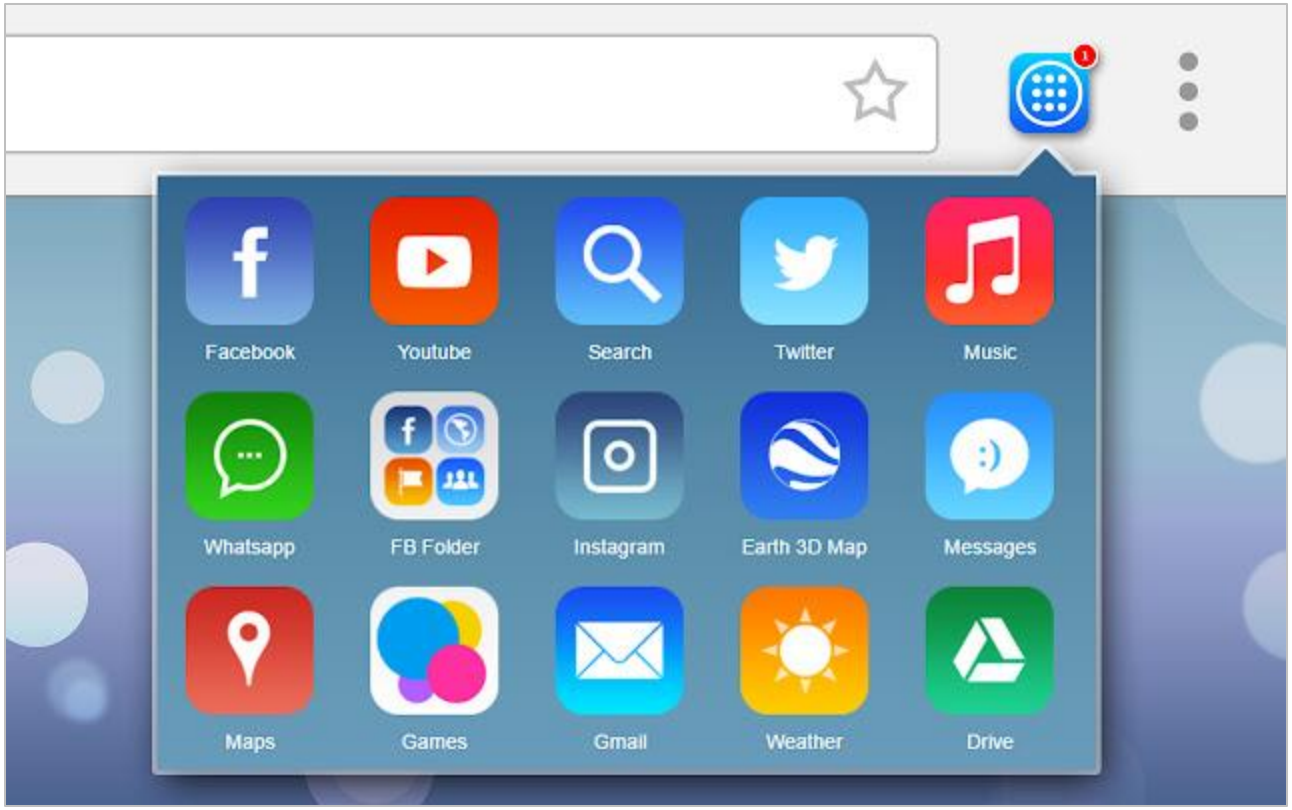


Embedded Software

Product Line Software

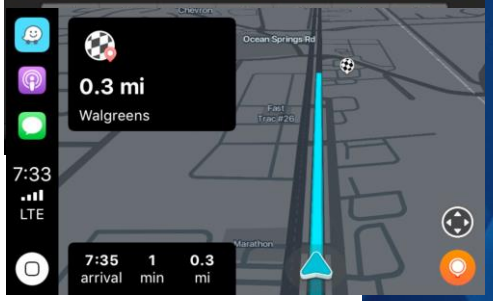


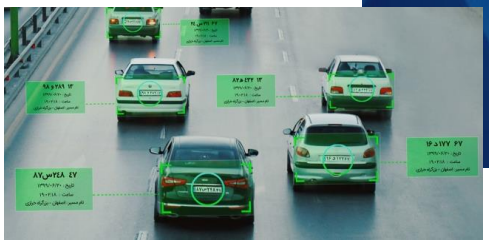
Web/Mobile Applications

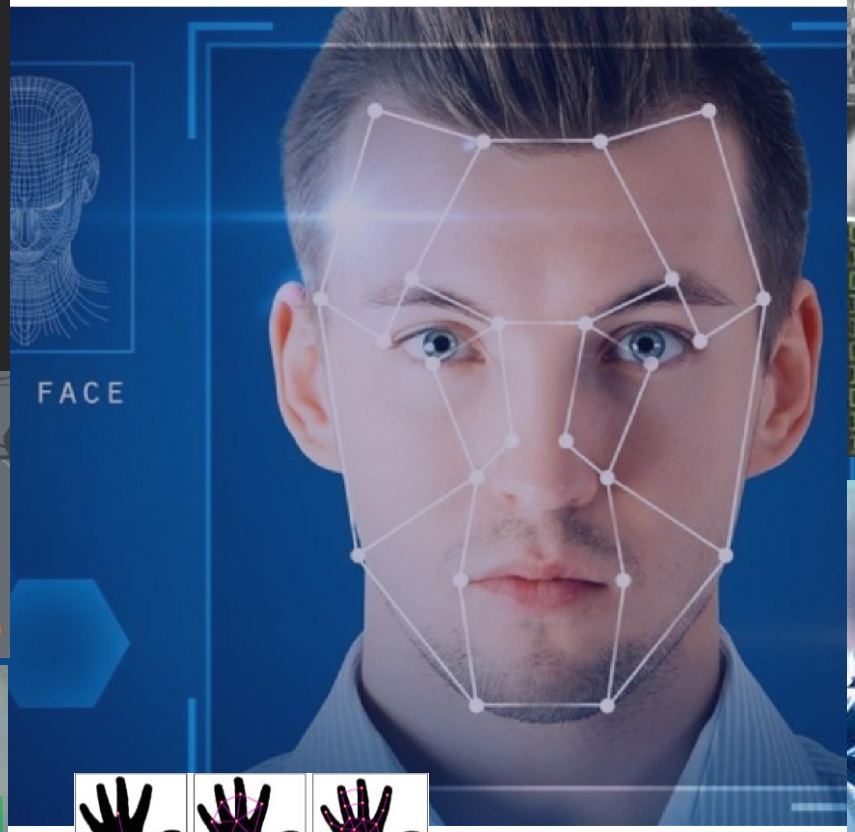


AI Software

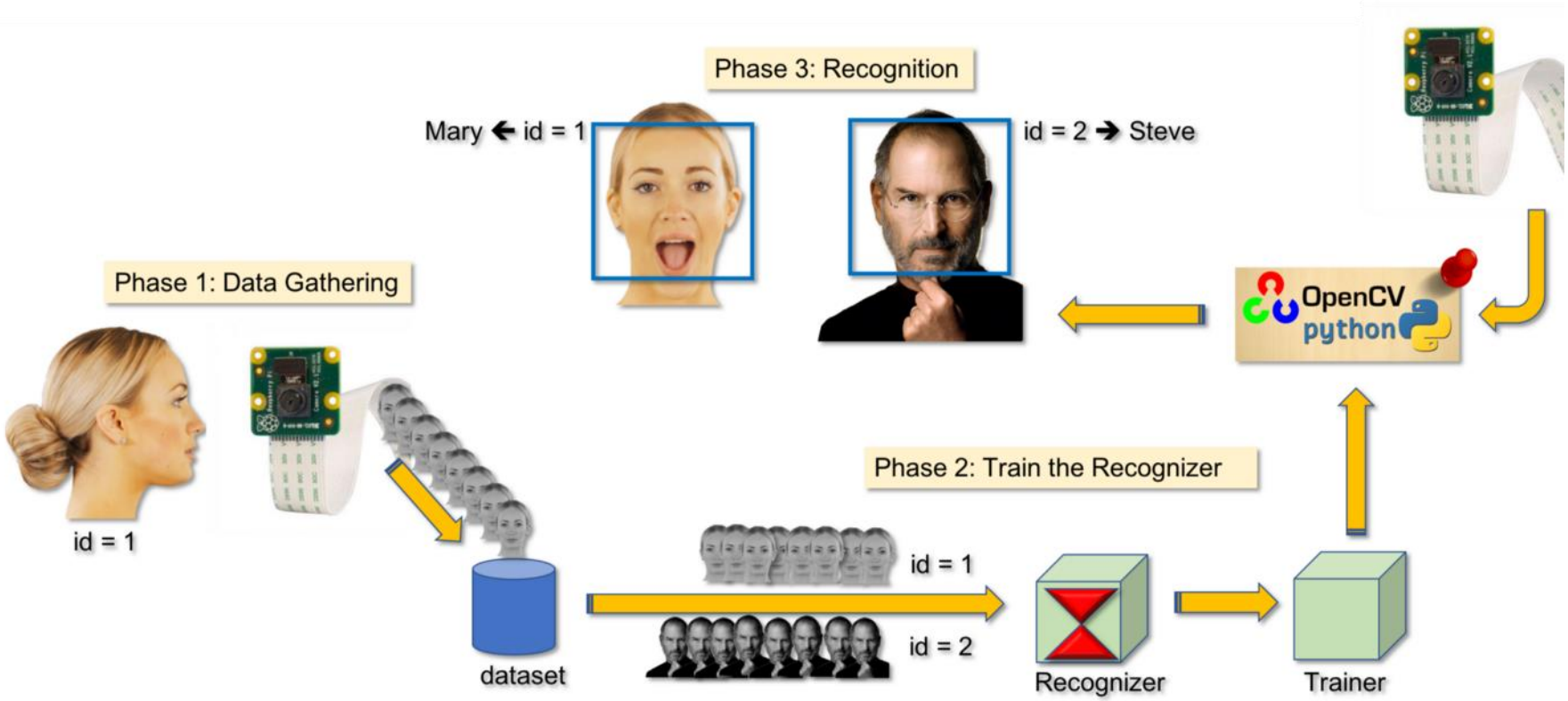

Guest
Computer


0.3 mi
Walgreens
7:33
LTE
7:35 arrival
1 min
0.3 mi

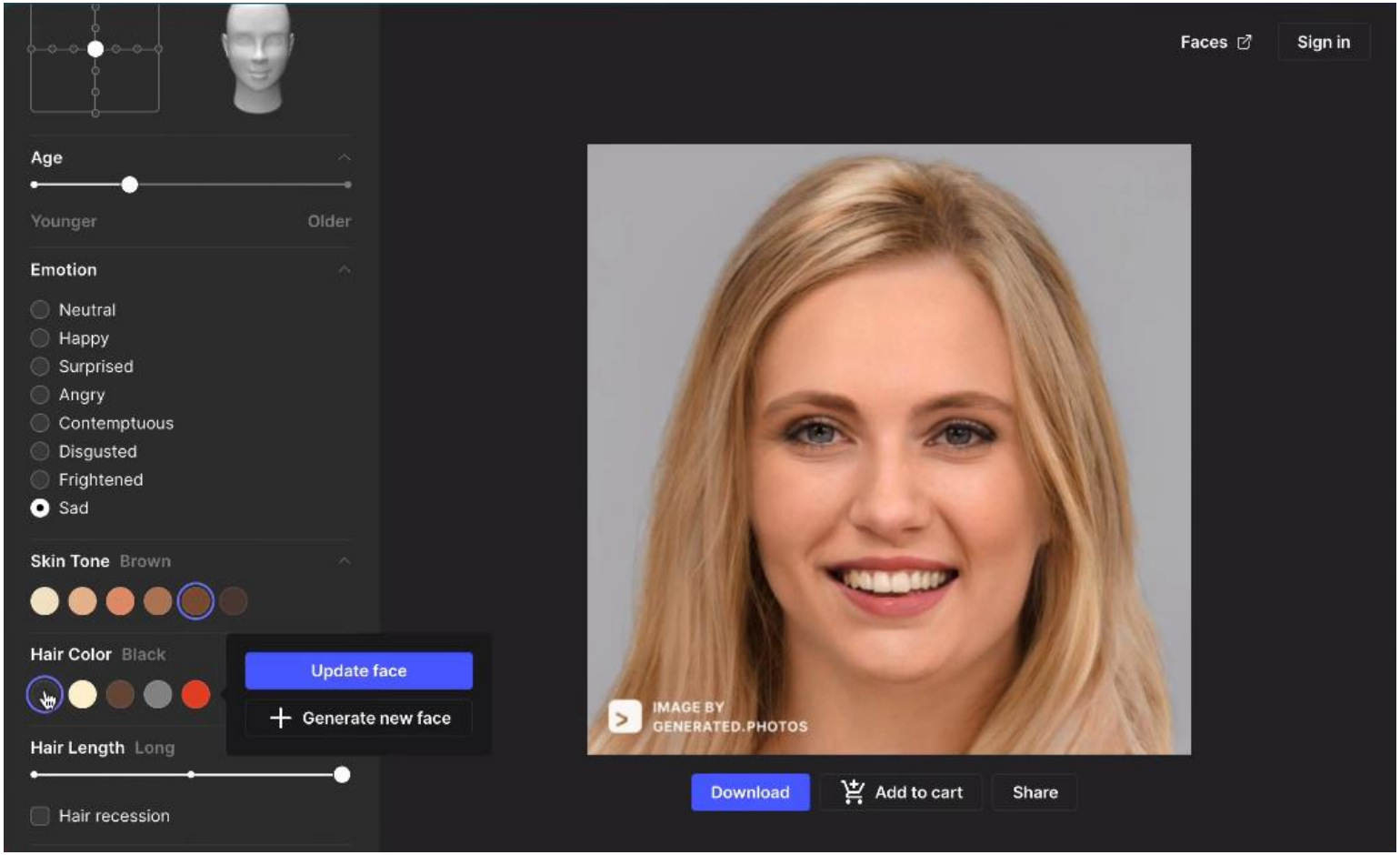



FACE

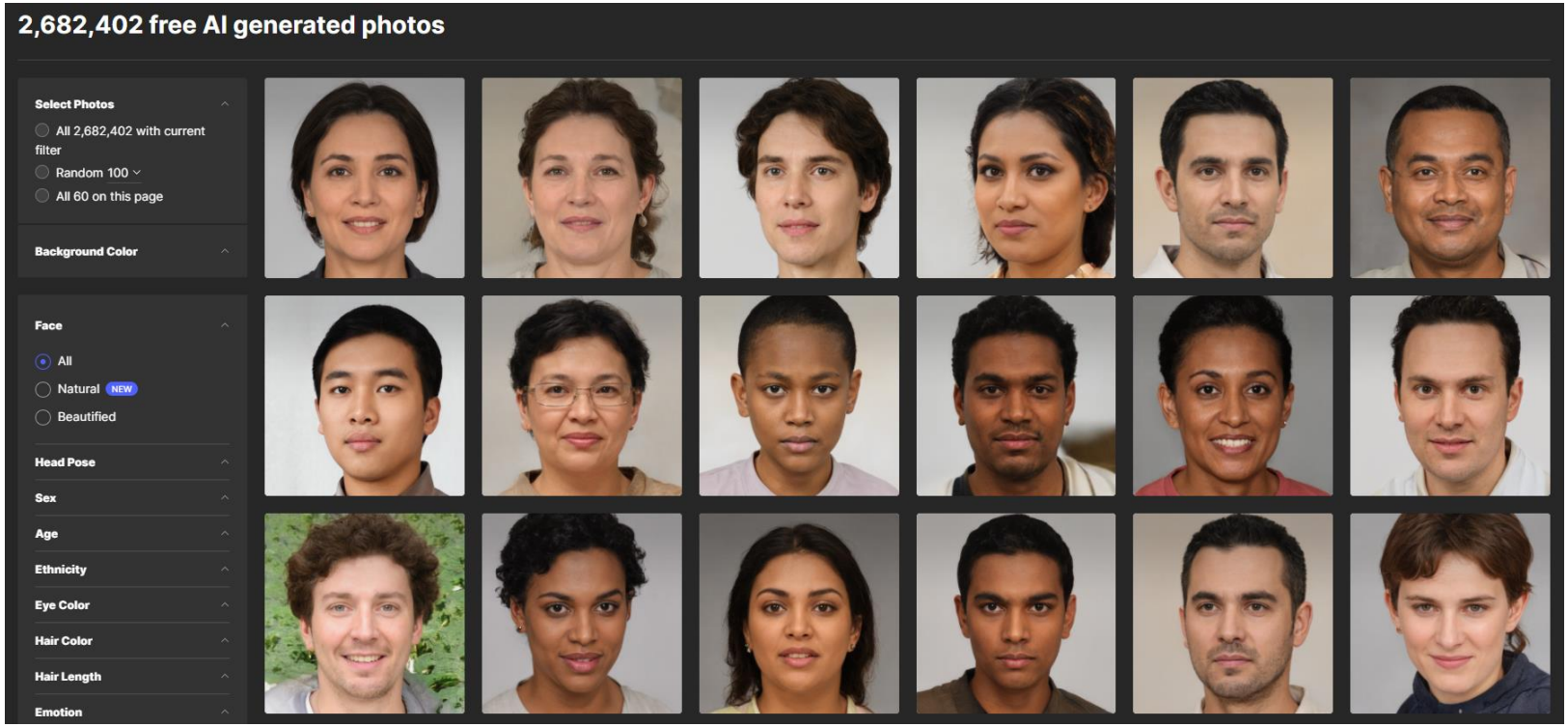
AI Software


Phase 3: Recognition
Mary ← id = 1
id = 2 → Steve
Phase 1: Data Gathering
OpenCV
python
Phase 2: Train the Recognizer
id = 1
id = 1
id = 2
dataset
Recognizer
Trainer

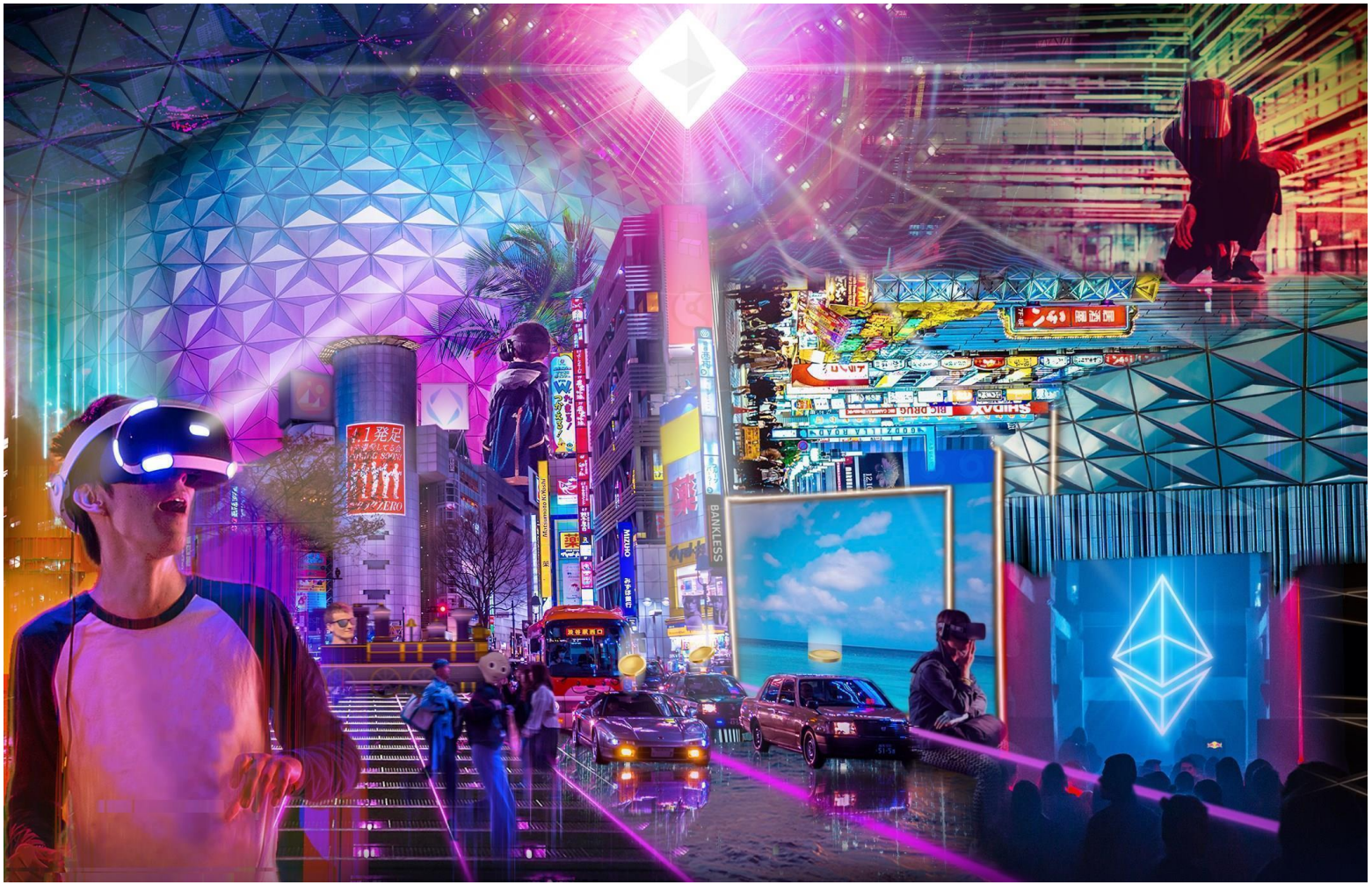
AI Software


Faces
Sign in
Age
Younger
Older
Emotion
Neutral
Happy
Surprised
Angry
Contemptuous
Disgusted
Frightened
Sad
Skin Tone Brown
Hair Color Black
Update face
Generate new face
Hair Length Long
Hair recession
IMAGE BY
GENERATED.PHOTOS
Download
Add to cart
Share

AI Software


2,682,402 free AI generated photos
Select Photos
All 2,682,402 with current filter
Random 100
All 60 on this page
Background Color
Face
All
Natural
NEW
Beautified
Head Pose
Sex
Age
Ethnicity
Eye Color
Hair Color
Hair Length
Emotion

AI Software



Legacy Software

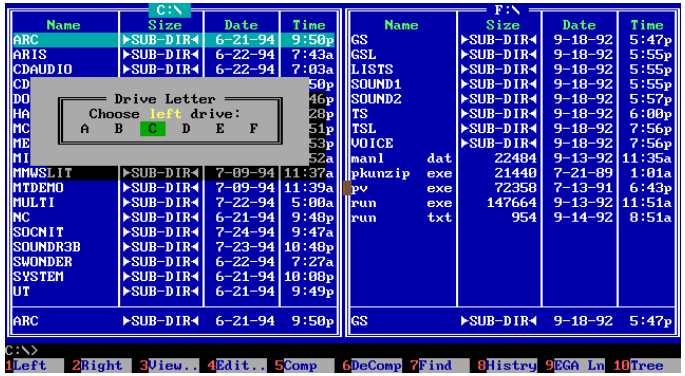
Why must it change?

1) software must be adapted to meet the needs of new computing environments or technology.

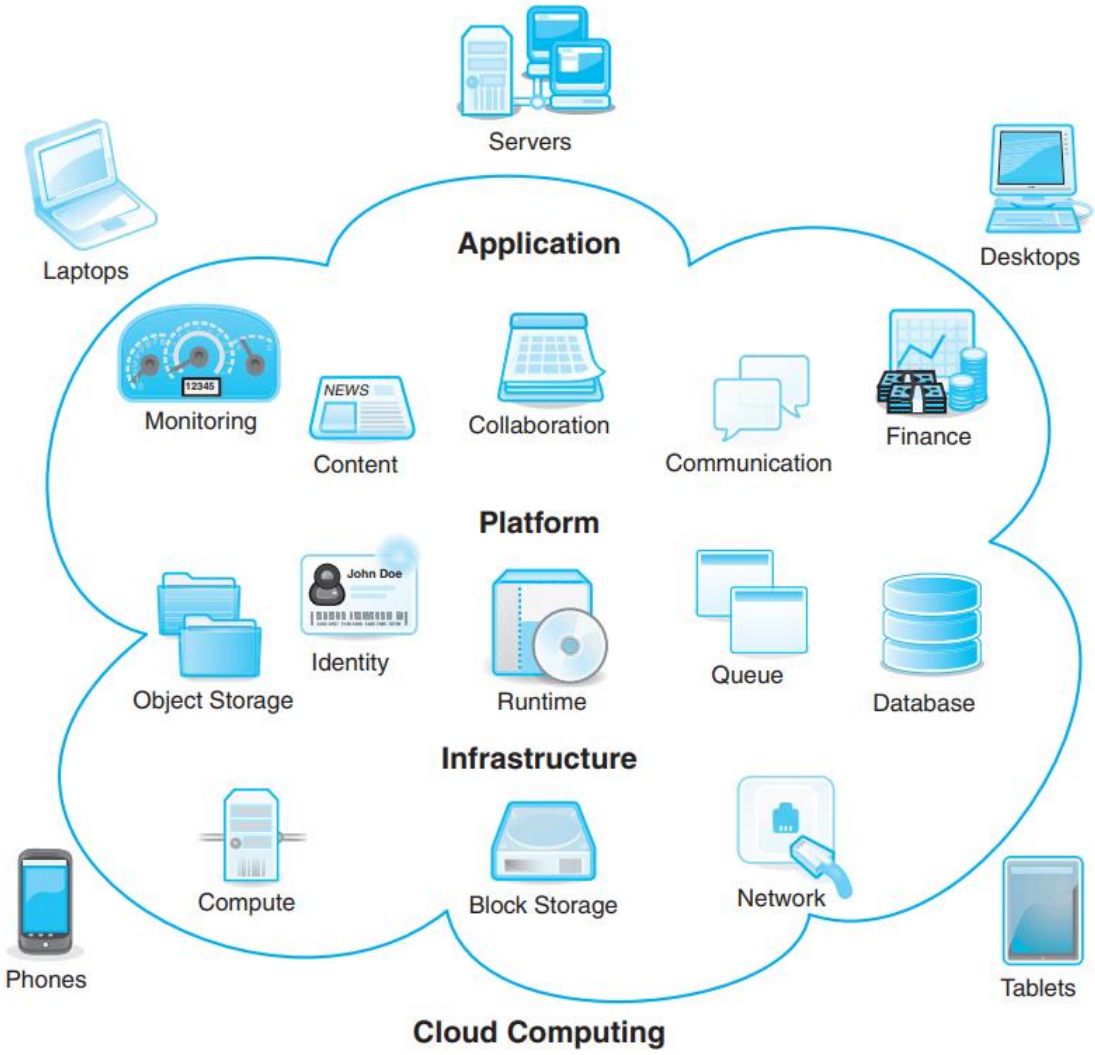
2) software must be enhanced to implement new business requirements.

3) software must be extended to make it interoperable with other more modern systems or databases.

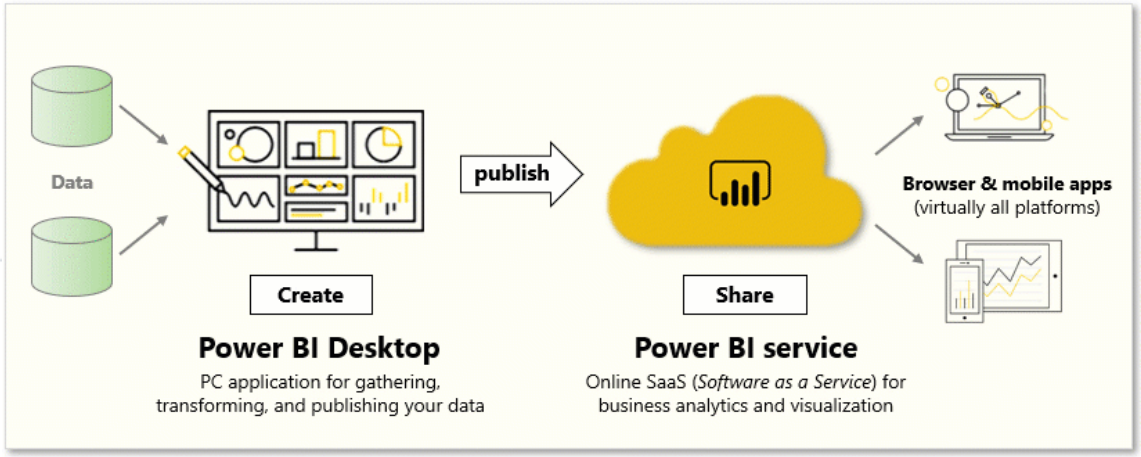
4) software must be re-architected to make it viable within a network environment.

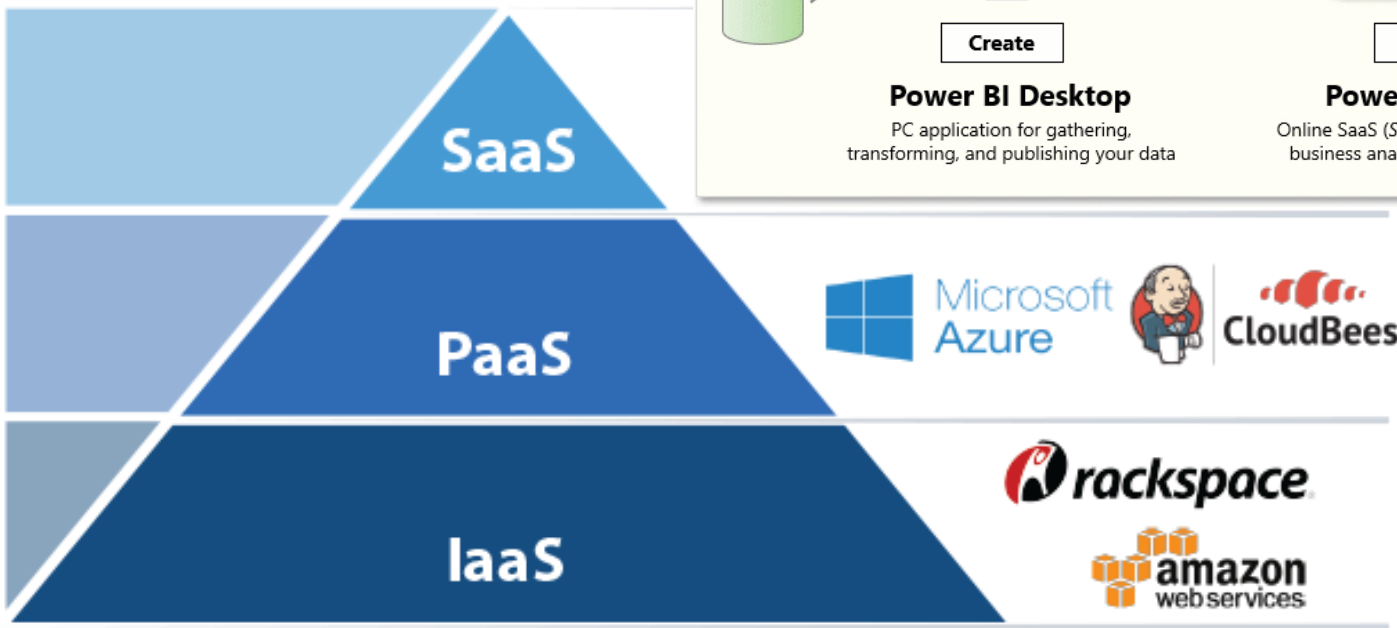


Cloud Computing

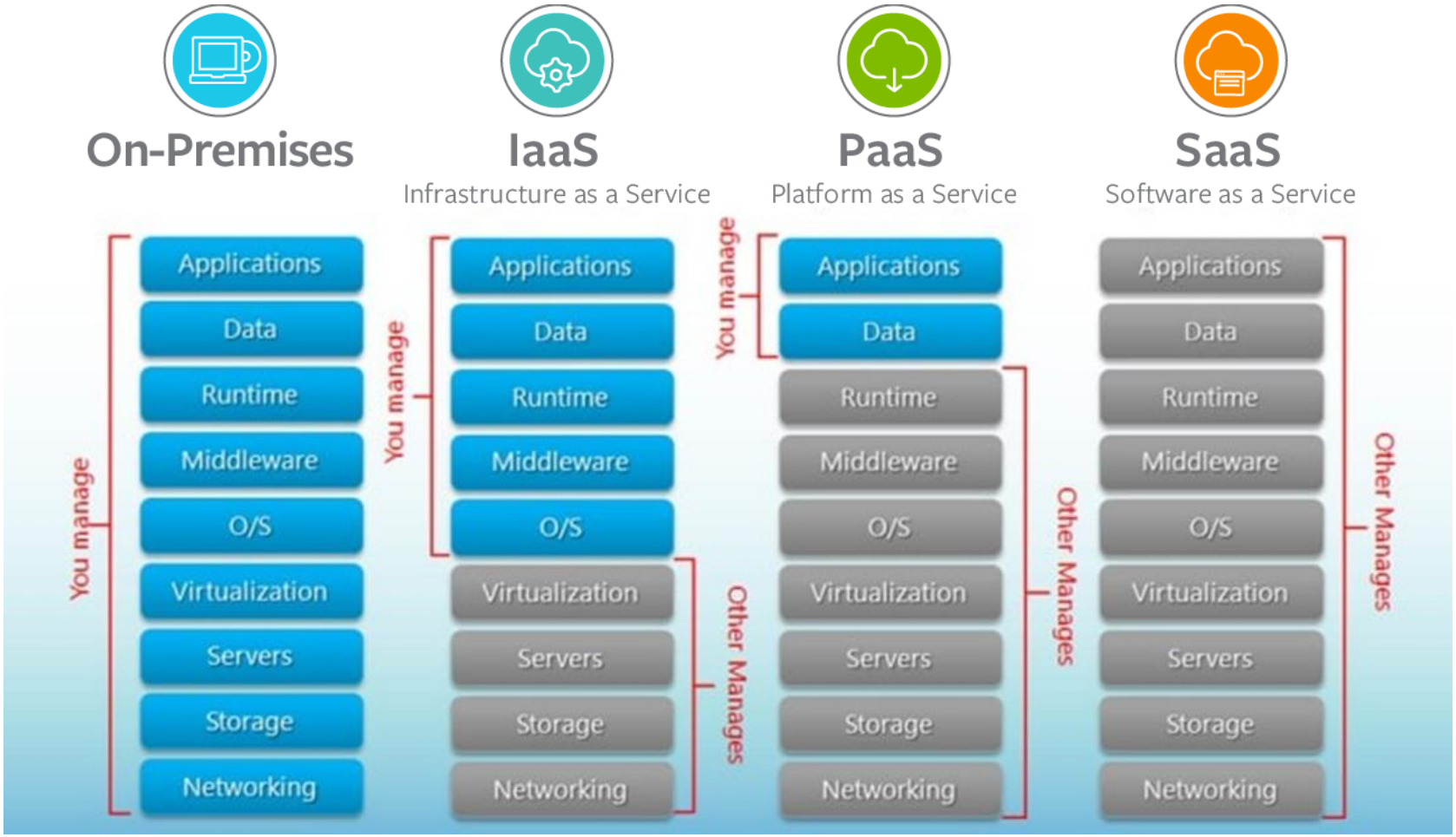


SaaS, PaaS, IaaS





SaaS, PaaS, IaaS, On-Premises

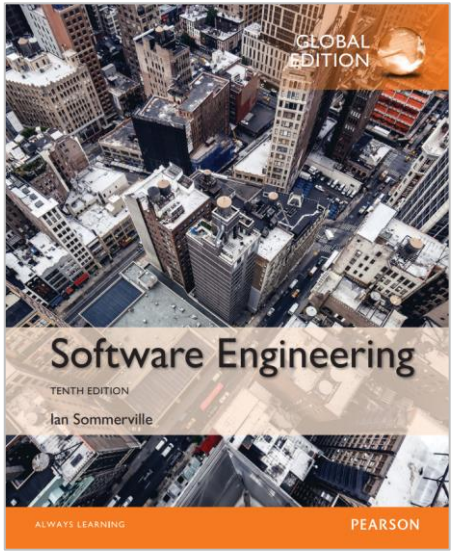


Question	Answer
What is software?	Computer programs and associated documentation. Software products may be developed for a particular customer or may be developed for a general market.
What are the attributes of good software?	Good software should deliver the required functionality and performance to the user and should be maintainable, dependable and usable.
What is software engineering?	Software engineering is an engineering discipline that is concerned with all aspects of software production from initial conception to operation and maintenance.
What are the fundamental software engineering activities?	Software specification, software development, software validation and software evolution.
What is the difference between software engineering and computer science?	Computer science focuses on theory and fundamentals; software engineering is concerned with the practicalities of developing and delivering useful software.
What is the difference between software engineering and system engineering?	System engineering is concerned with all aspects of computer-based systems development including hardware, software and process engineering. Software engineering is part of this more general process.
What are the key challenges facing software engineering?	Coping with increasing diversity, demands for reduced delivery times and developing trustworthy software.
What are the costs of software engineering?	Roughly 60% of software costs are development costs, 40% are testing costs. For custom software, evolution costs often exceed development costs.
What are the best software engineering techniques and methods?	While all software projects have to be professionally managed and developed, different techniques are appropriate for different types of system. For example, games should always be developed using a series of prototypes whereas safety critical control systems require a complete and analyzable specification to be developed. There are no methods and techniques that are good for everything.
What differences has the Internet made to software engineering?	Not only has the Internet led to the development of massive, highly distributed, service-based systems, it has also supported the creation of an "app" industry for mobile devices which has changed the economics of software.

Evaluation Criteria:

Criteria	Marks	Comments
Class Activity	25%	-
HomeWorks	15%	-
Projects	30%	-
Midterm Exam	10%	-
Final Exam	20%	-

References: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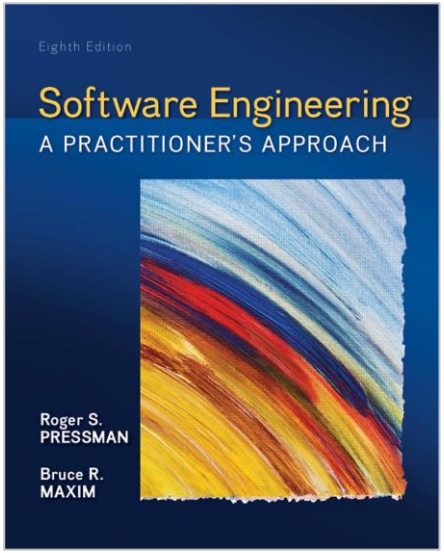
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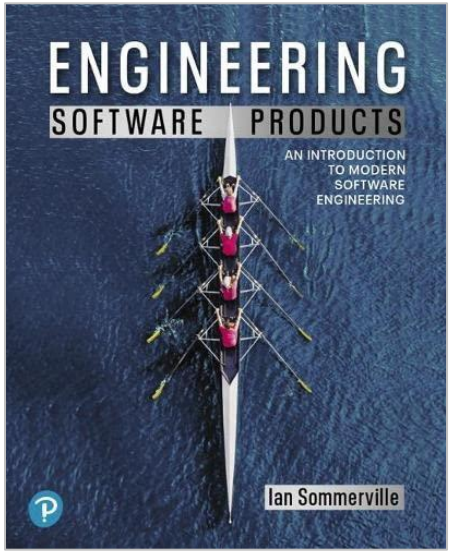
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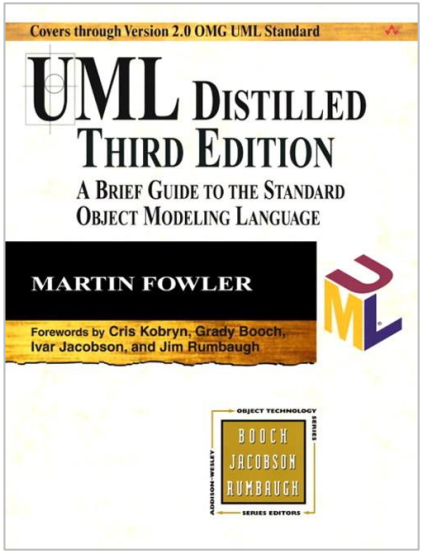
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