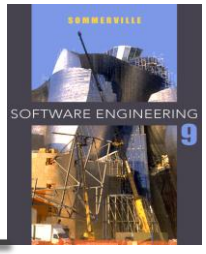
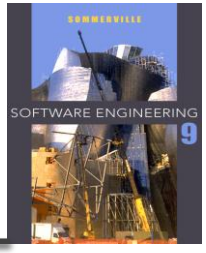


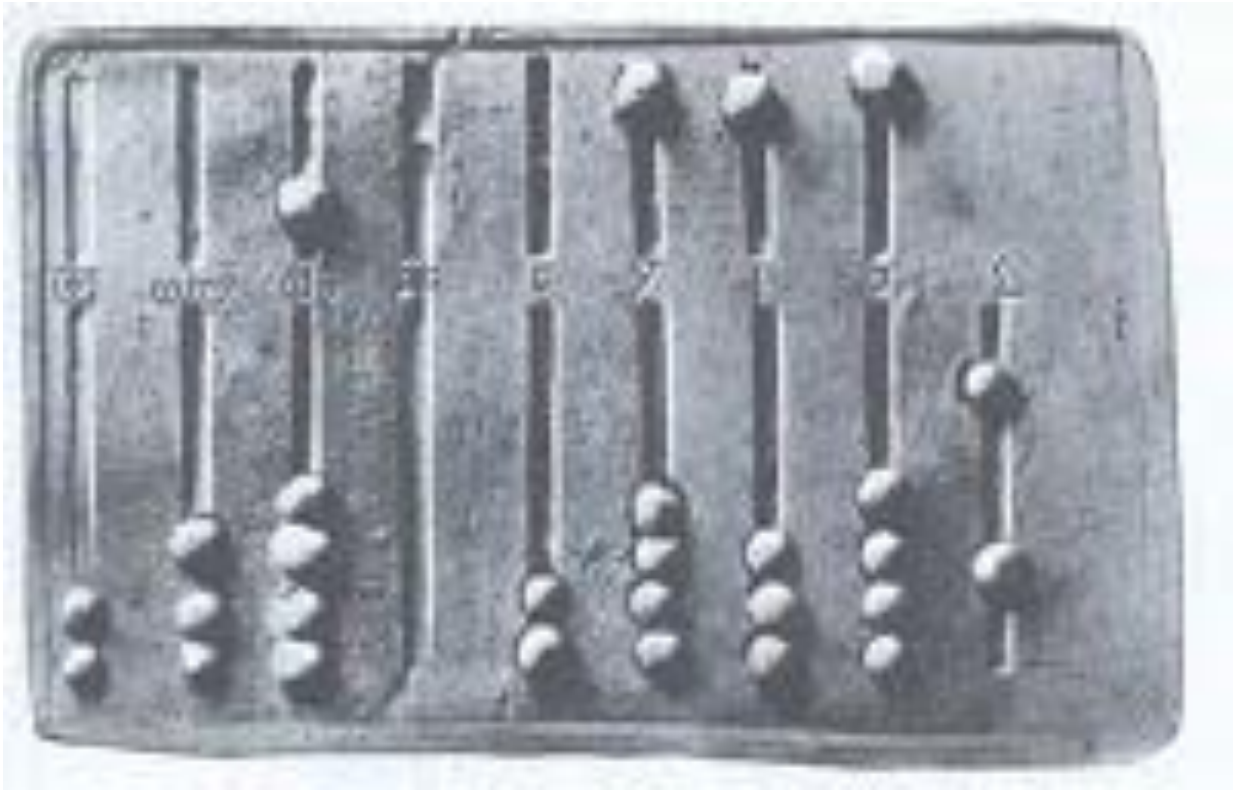
Chapter 1- Introduction to Software Engineering

Lecture 1

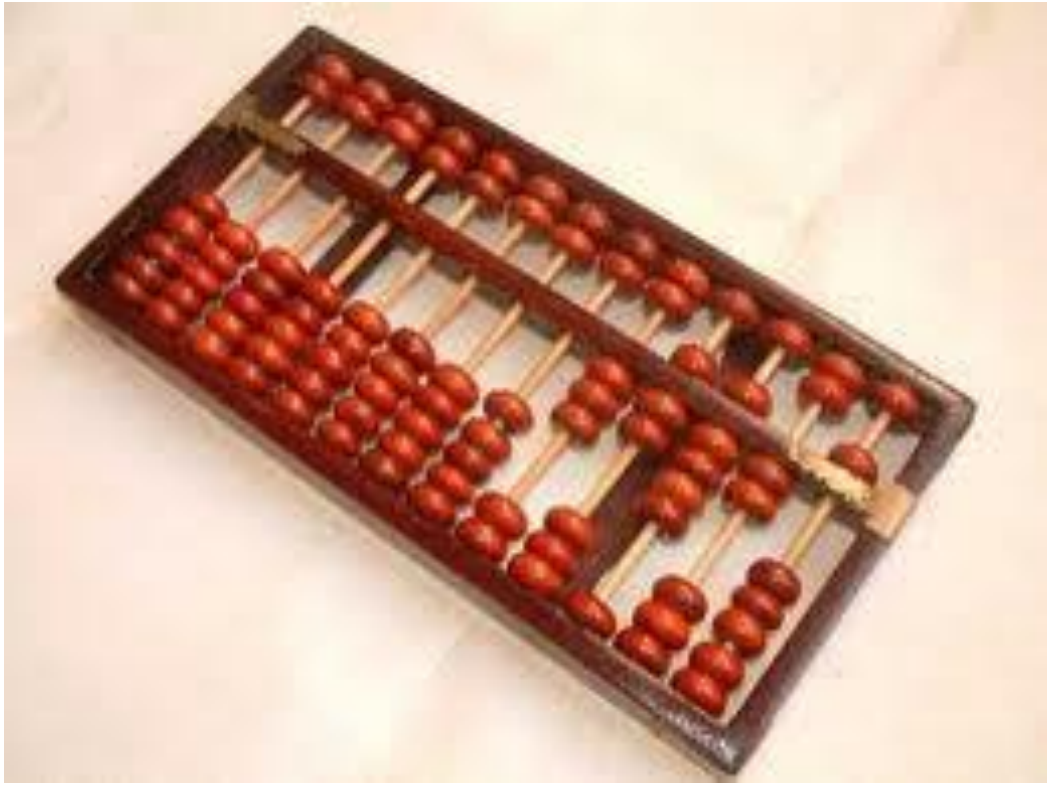
Overview

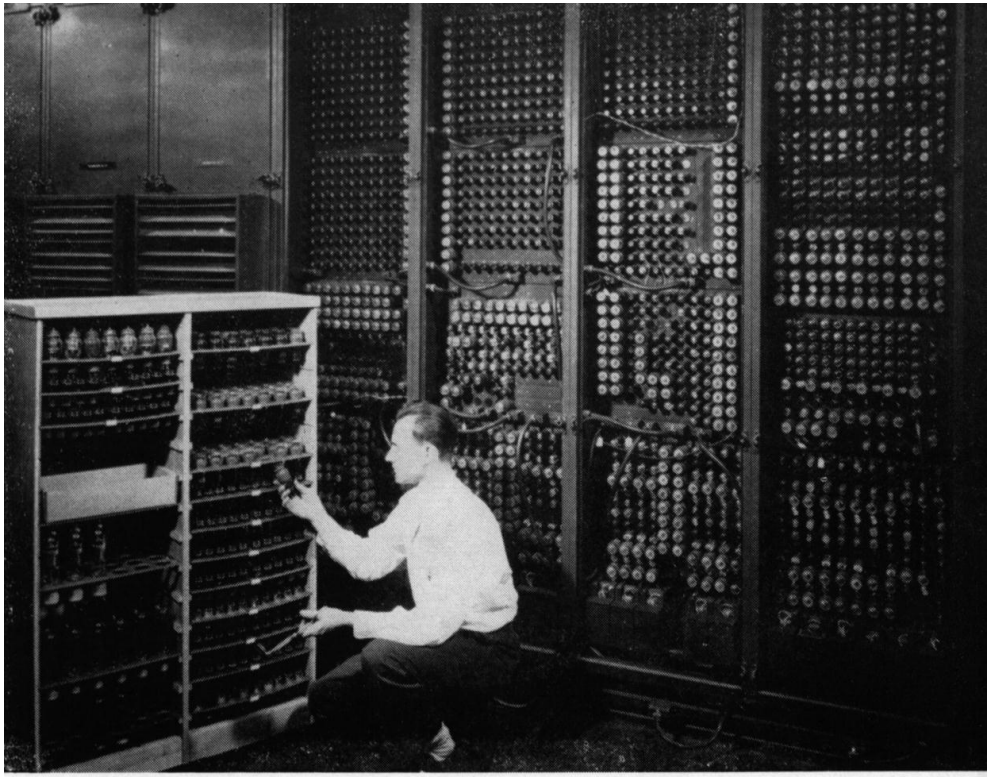


- ✧ 1.1 Professional Software Development
- ✧ 1.2 Software Engineering Ethics



ancient abacus (about 2000 years old)

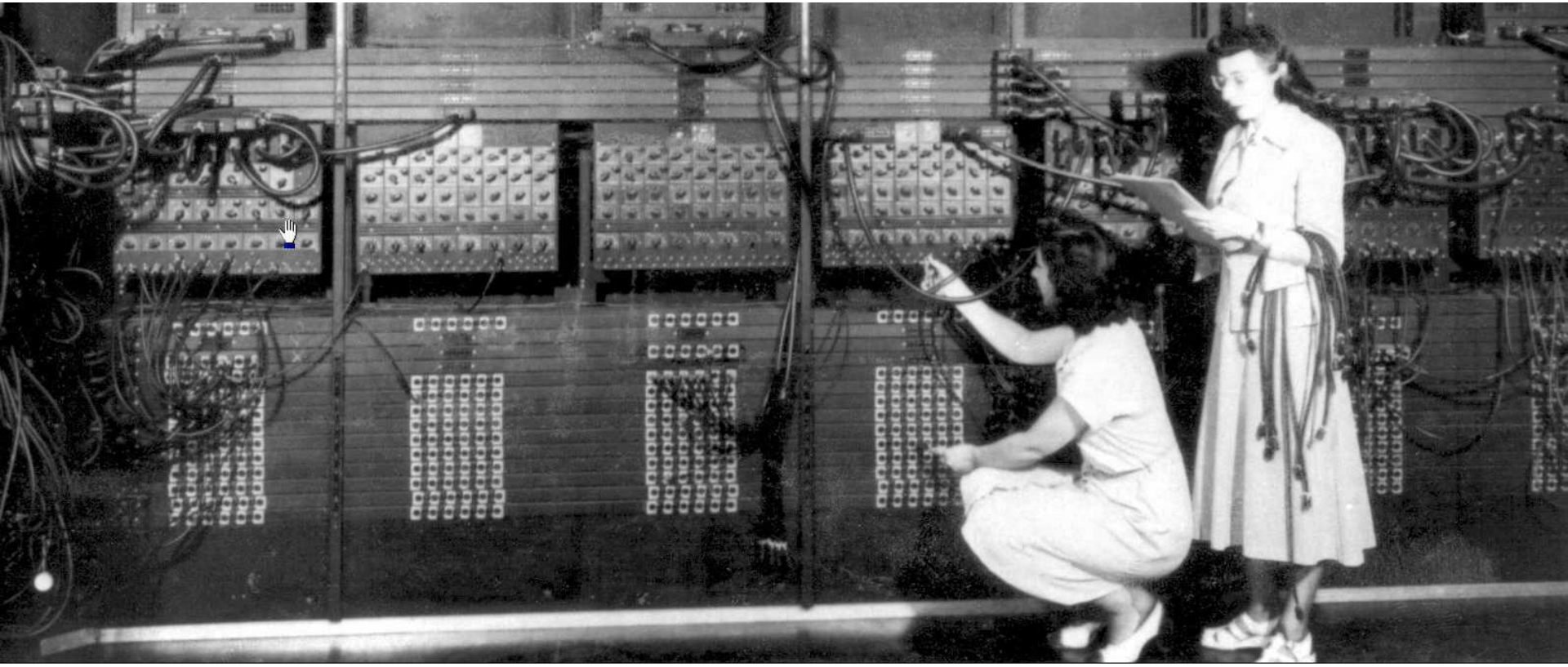




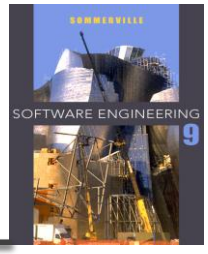
Replacing a bad tube meant checking among ENIAC's 19,000 possibilities.

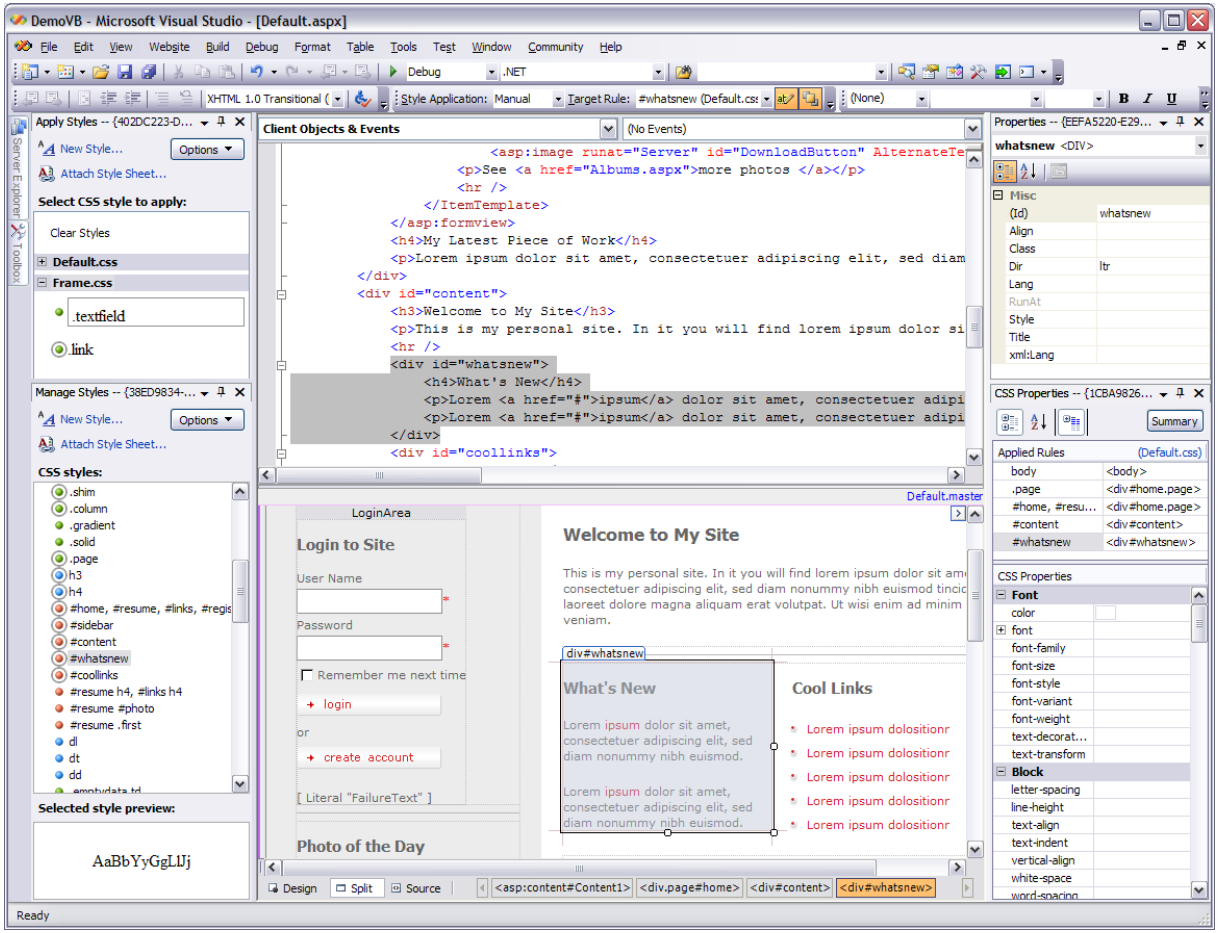
Eniac – first general purpose electronic computer (1946)

How to give instructions to computers ..



.. evolved, too


SOMMERVILLE
SOFTWARE ENGINEERING
9

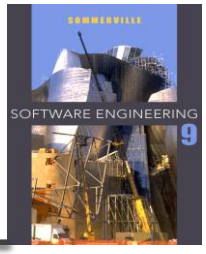

DemoVB - Microsoft Visual Studio - [Default.aspx]
File Edit View Website Build Debug Format Table Tools Test Window Community Help
Debug .NET
XHTML 1.0 Transitional
Style Application: Manual
Target Rule: #whatsnew (Default.cs
(None)
Apply Styles -- {402DC223-D...
New Style...
Options
Attach Style Sheet...
Select CSS style to apply:
Clear Styles
Default.css
Frame.css
.textfield
link
Manage Styles -- {38ED9834-...
New Style...
Options
Attach Style Sheet...
CSS styles:
.shim
.column
.gradient
.solid
.page
h3
h4
#home, #resume, #links, #regis
#sidebar
#content
#whatsnew
#coollinks
#resume h4, #links h4
#resume #photo
#resume .first
dl
dt
dd
Selected style preview:
AaBbYyGgLlJj
Client Objects & Events
(No Events)
<asp:image runat="Server" id="DownloadButton" AlternateTe
See more photos
<hr />
</ItemTemplate>
</asp:formview>
<h4>My Latest Piece of Work</h4>
Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam

<h3>Welcome to My Site</h3>
This is my personal site. In it you will find lorem ipsum dolor si
<hr />

<h4>What's New</h4>
Lorem ipsum dolor sit amet, consectetuer adipi
Lorem ipsum dolor sit amet, consectetuer adipi

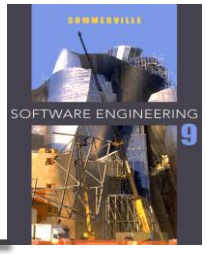
Default.master
LoginArea
Login to Site
User Name
Password
Remember me next time
login
or
create account
[Literal "FailureText"]
Photo of the Day
Welcome to My Site
This is my personal site. In it you will find lorem ipsum dolor sit am
consectetuer adipiscing elit, sed diam nonummy nibh euismod tincic
laoreet dolore magna aliquam erat volutpat. Ut wisi enim ad minim
veniam.
div#whatsnew
What's New
Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod.
Lorem ipsum dolor sit amet, consectetuer adipiscing elit, sed diam nonummy nibh euismod.
Cool Links
Lorem ipsum dolositionr
Lorem ipsum dolositionr
Lorem ipsum dolositionr
Lorem ipsum dolositionr
Lorem ipsum dolositionr
Design Split Source
<asp:content#Content1> <div.page#home> <div#content> <div#whatsnew>
Properties -- {EEFA5220-E29...
whatsnew <DIV>
Misc
(Id) whatsnew
Align
Class
Dir ltr
Lang
RunAt
Style
Title
xml:Lang
CSS Properties -- {1CBA9826...
Summary
Applied Rules (Default.css)
body <body>
.page <div#home.page>
#home, #resu... <div#home.page>
#content <div#content>
#whatsnew <div#whatsnew>
CSS Properties
Font
color
font
font-family
font-size
font-style
font-variant
font-weight
text-decorat...
text-transform
Block
letter-spacing
line-height
text-align
text-indent
vertical-align
white-space
word-spacing
Ready

Economic importance of software



- Economies of all developed nations are dependent on software.
- More and more systems are software controlled
- Software represents a significant fraction of GNP

SPEED THINK:



Pair up

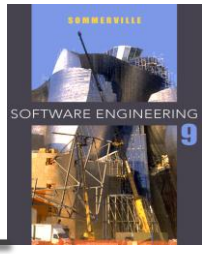
You have 1 min to brain storm everything that

you know about . . . .

Count as you go.

How many things could you come up with?

SPEED THINK - TEST ROUND



Pair up

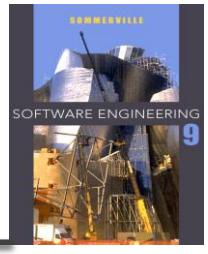
You have 1 min to brain storm everything that

you know about . . . .

Count as you go.

How many things could you come up with?

SPEED THINK - TEST ROUND



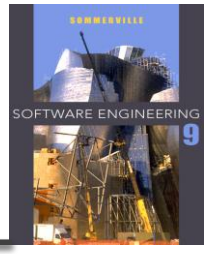
Pair up - **stand up**

You have 1 min to brain storm everything that you know about . . . .

Count as you go.

How many things could you come up with?

SPEED THINK - TEST ROUND

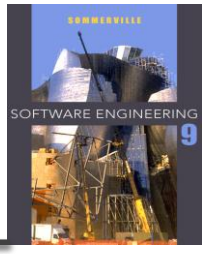


Pair up - **stand up**

You have 1 min to brain storm everything that you know about **CARS**

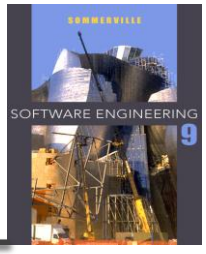
Count as you go.

How many things could you come up with?



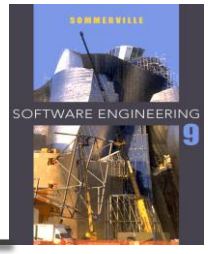
TIME UP

Economic importance of software



- Economies of all developed nations are dependent on software.
- More and more systems are software controlled
- Software represents a significant fraction of GNP

SPEED THINK



Pair up - **stand up**

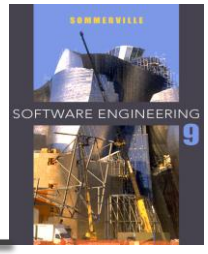
You have 1 min to brain storm . . .

. . .

Count as you go.

How many things could you come up with?

SPEED THINK



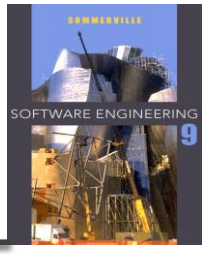
Pair up - **stand up**

You have 1 min to brain storm …

areas that depend on software

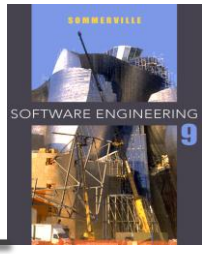
Count as you go.

How many things could you come up with?



TIME UP

2 kinds of software products



Generic Products

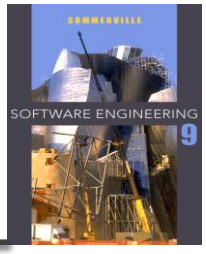
Organization that develops software controls specification

Customized Products

Customer provides specification

.

2 kinds of software products



Generic Products

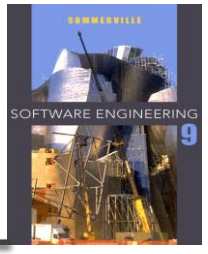
Organization that develops software controls specification

Customized Products

Customer provides specification

- **TODO: 2 min**
  One piece of paper per table
  List examples for both categories

2 kinds of software products



Generic Products

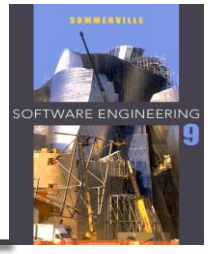
Organization that develops software controls specification

Customized Products

Customer provides specification

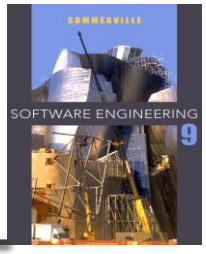
With software reuse this distinction gets blurred

Essential attributes of good software Fig.1.2



Maintainability

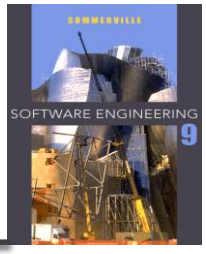
Essential attributes of good software Fig.1.2



Maintainability

Dependability
Security

Essential attributes of good software Fig.1.2

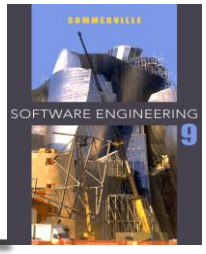


Maintainability

Dependability
Security

Efficiency

Essential attributes of good software Fig.1.2



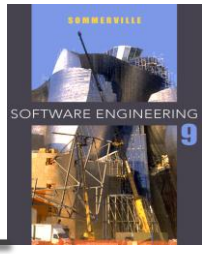
Maintainability

Dependability
Security

Efficiency

Acceptability

Essential attributes of good software Fig.1.2



Maintainability

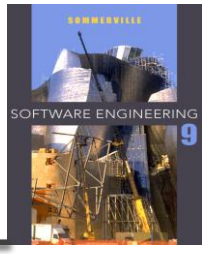
Dependability
Security

Efficiency

Acceptability

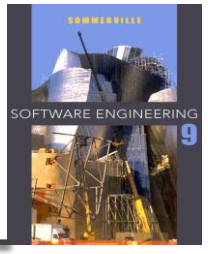
TODO:
brain-storm examples
of software that missed one of these essential attributes

1.1.1 Software engineering



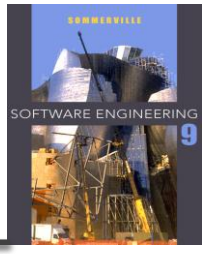
✧ Software engineering is an engineering discipline that is concerned with all aspects of software production from specification to evolution.

Software engineering



- Software engineering is an engineering discipline that is concerned with all aspects of software production from specification to evolution.
- Engineering discipline
  - Select most appropriate way for given circumstance - pragmatic

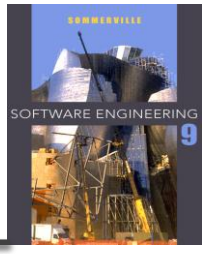
Software engineering



- Software engineering is an engineering discipline that is concerned with all aspects of software production from specification to evolution.
- Engineering discipline
  - Select most appropriate way for given circumstance – pragmatic

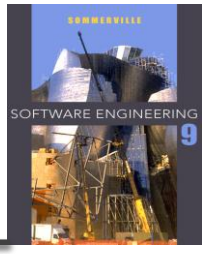
    getting required results of required quality within schedule and budget

Software engineering

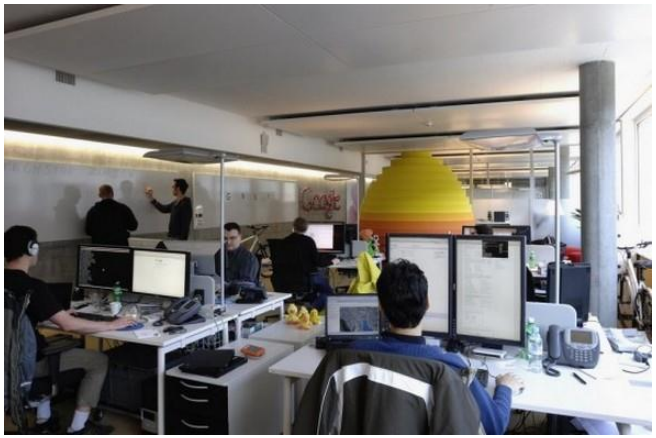


- Software engineering is an engineering discipline that is concerned with all aspects of software production from specification to evolution.
- Engineering discipline
  - Select most appropriate way for given circumstance - pragmatic
- All aspects of software production
  - Incl. project management, documentation, software configuration …

Software engineering

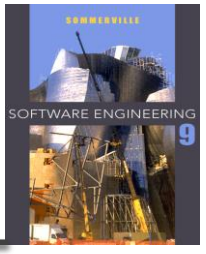


- Software engineering is intended to support professional development rather than individual programming

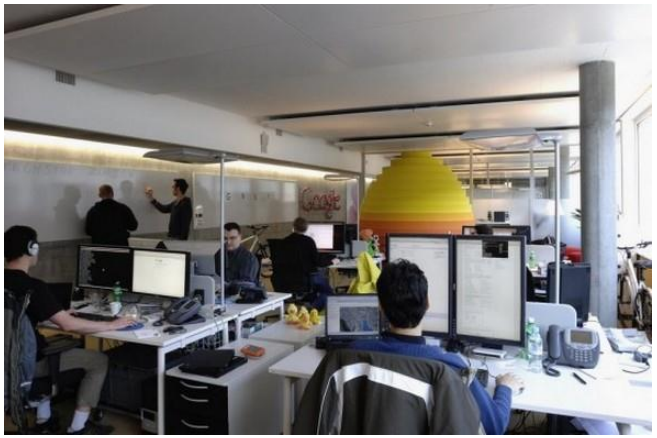


professional programming

Software engineering



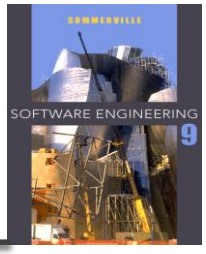
- Software engineering is intended to support professional development rather than individual programming



professional programming

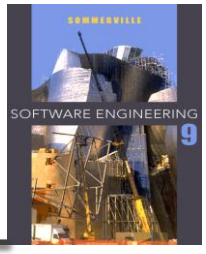
individual programming

Software engineering



- A systematic, organized approach is often most effective to produce high-quality software.

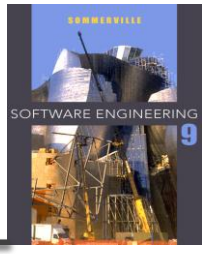
Software engineering



✧ A systematic, organized approach is often most effective to produce high-quality software.

a.k.a. **Software Process**

Software engineering

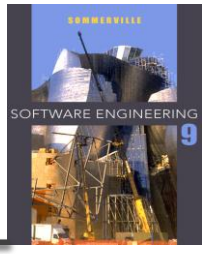


✧ A systematic, organized approach is often most effective to produce high-quality software.

a.k.a. Software Process

Sequence of activities that lead to software product

Software engineering



✧ A systematic, organized approach is often most effective to produce high-quality software.

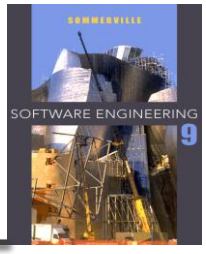
a.k.a. Software Process

Sequence of activities that lead to software product

✧ Different types of systems need different development processes

e.g. real–time system in aircraft vs e–commerce software

Software engineering



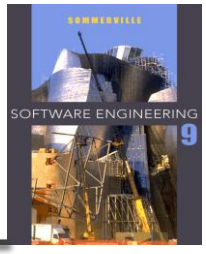
✧ A systematic, organized approach is often most effective to produce high-quality software.

a.k.a. Software Process

Sequence of activities that lead to software product

✧ No one software engineering method or technique applies to all software

Software engineering



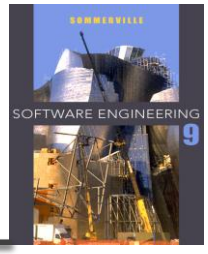
✧ A systematic, organized approach is often most effective to produce high-quality software.

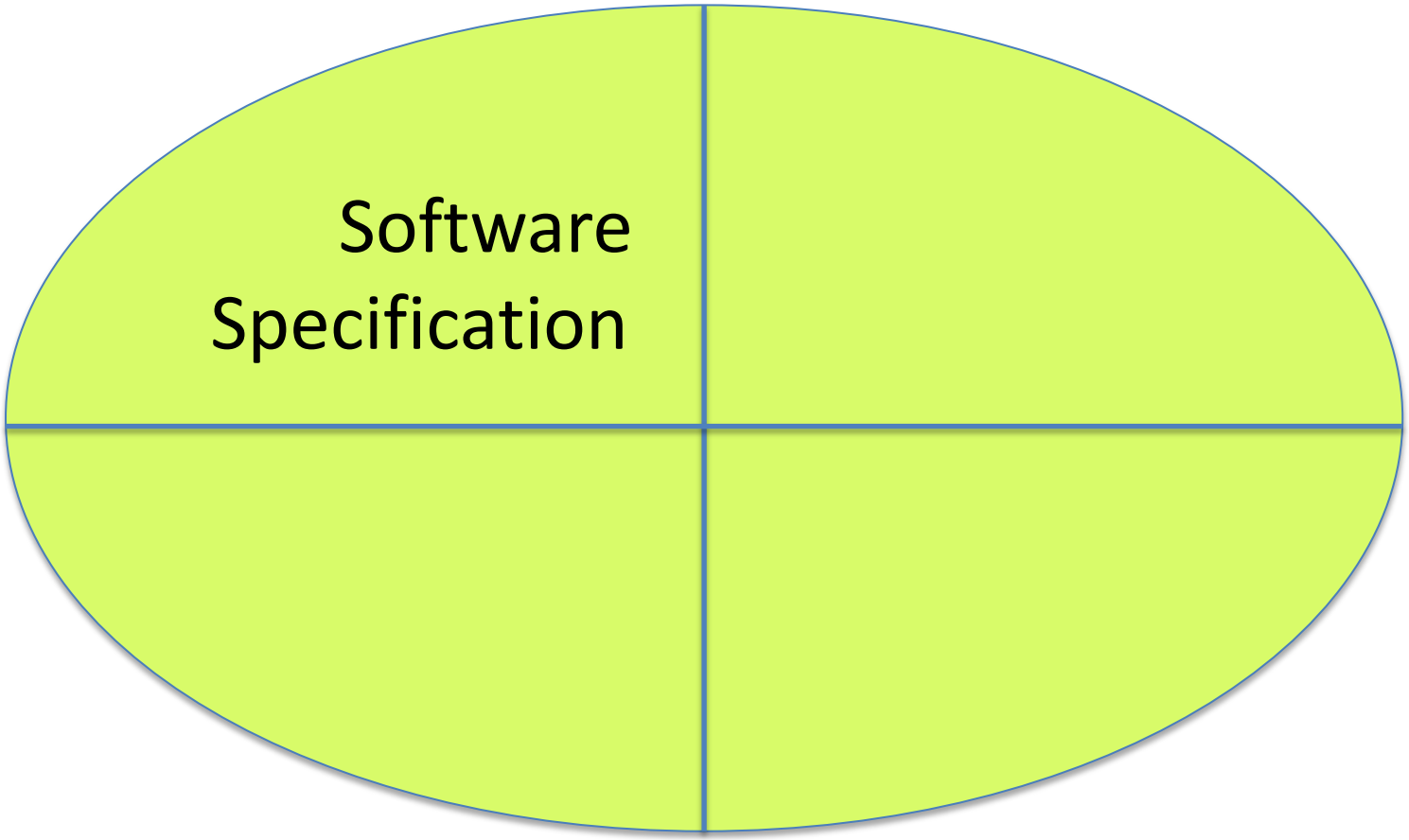
a.k.a. Software Process

Sequence of activities that lead to software product

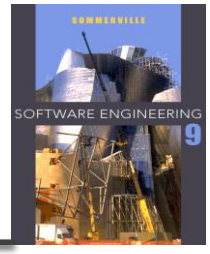
✧ There are 4 fundamental activities common to all software processes

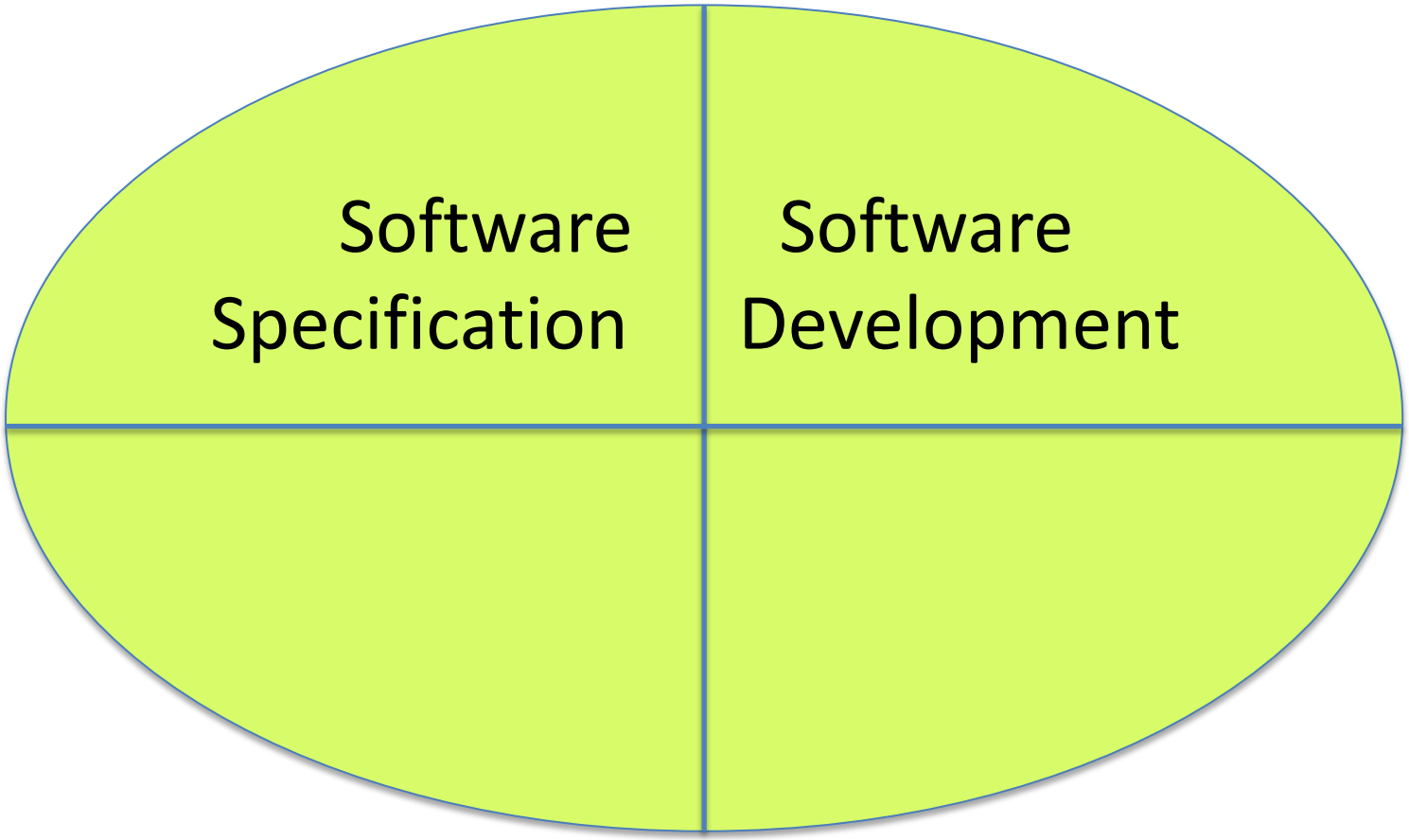
Software process activities



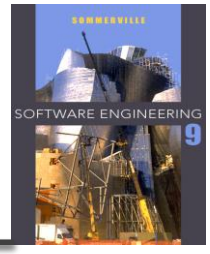


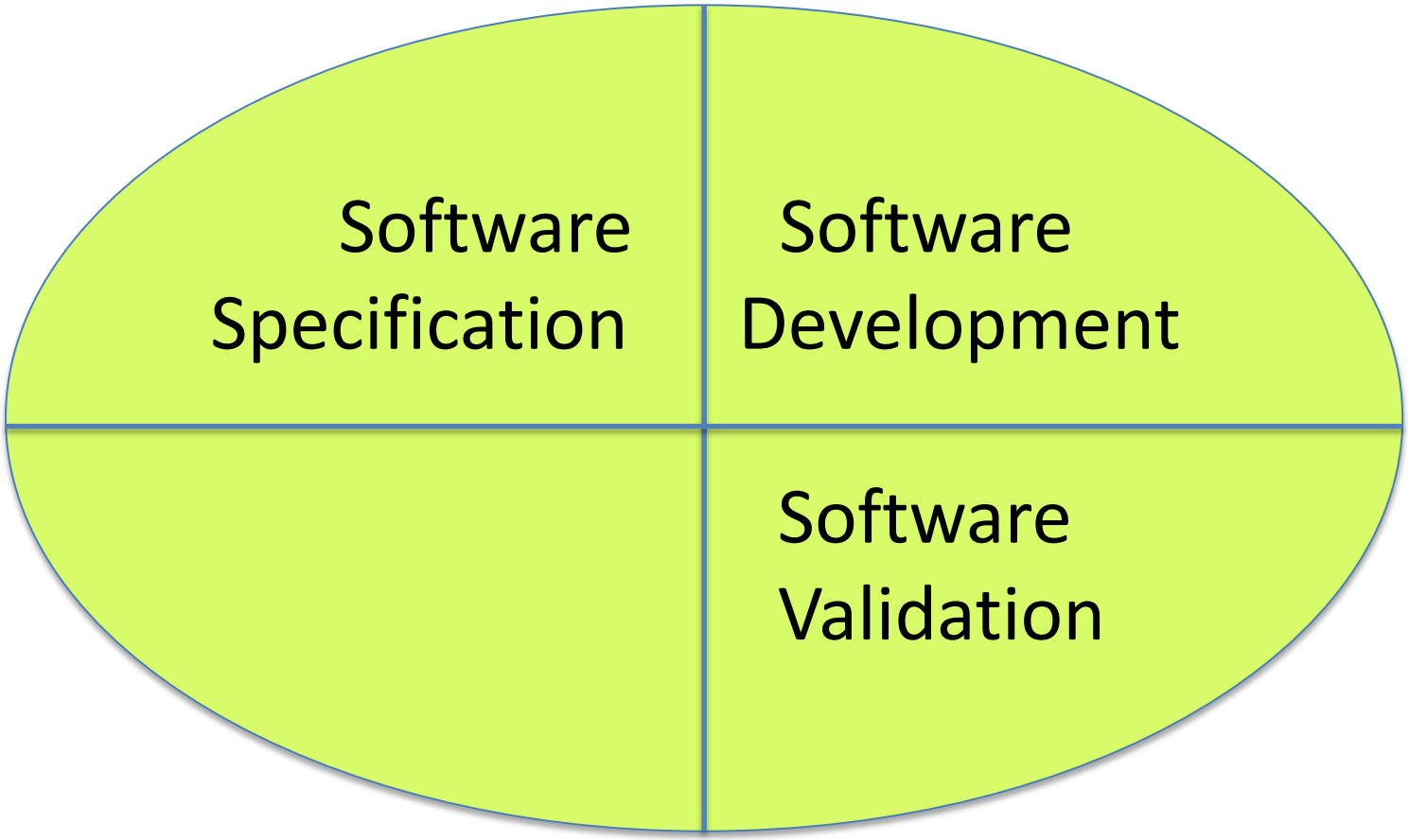
Software process activities



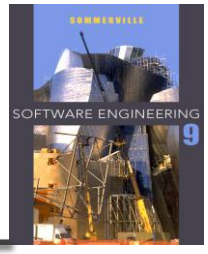


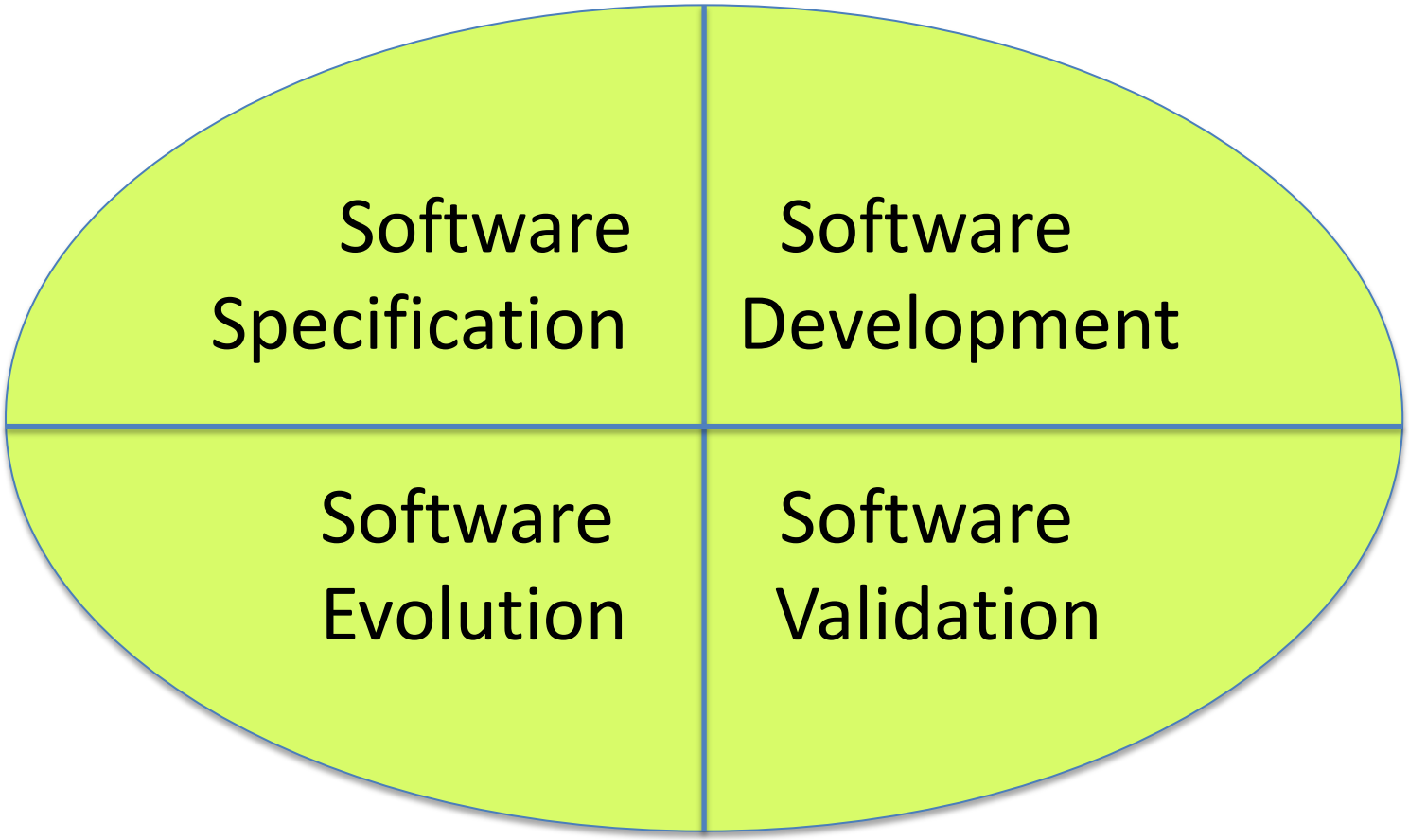
Software process activities



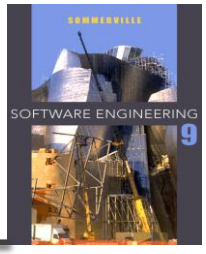


Software process activities



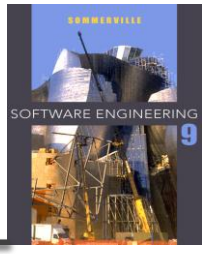


3 General issues that affect most software



Heterogeneity

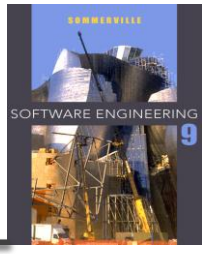
3 General issues that affect most software



Heterogeneity

Need for dependable software that can cope with heterogeneity

3 General issues that affect most software

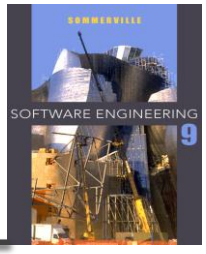


Heterogeneity

Need for dependable software that can cope with heterogeneity

Business and Social Change

3 General issues that affect most software



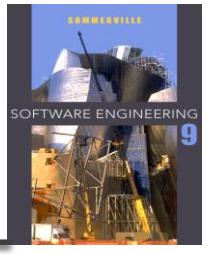
Heterogeneity

Need for dependable software that can cope with heterogeneity

Business and Social Change

Need for rapid implementation and delivery

3 General issues that affect most software



Heterogeneity

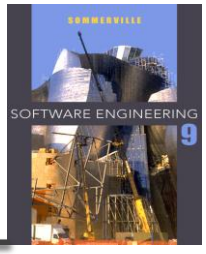
Need for dependable software that can cope with heterogeneity

Business and Social Change

Need for rapid implementation and delivery

Security and Trust

3 General issues that affect most software



Heterogeneity

Need for dependable software that can cope with heterogeneity

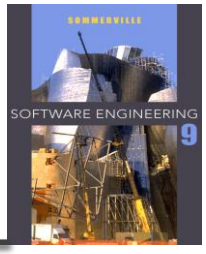
Business and Social Change

Need for rapid implementation and delivery

Security and Trust

Need for secure and trustworthy software

3 General issues that affect most software



Heterogeneity

Need for dependable software that can cope with heterogeneity

Business and Social Change

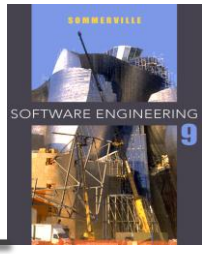
Need for rapid implementation and delivery

Security and Trust

Need for secure and trustworthy software

TODO: Brainstorm issues that fall in on of these 3 categories

1.1.2 Software engineering diversity

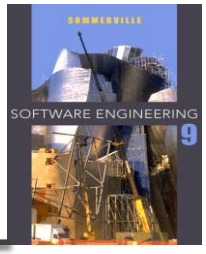


Many software engineering methods and tools have been developed

Which one should you use?

=> consider type of application

1.1.2 Software engineering diversity



Many software engineering methods and tools have been developed

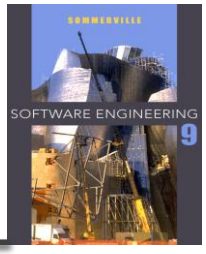
Which one should you use?

=> consider type of application

TODO:

Class activity

1.1.2 Software engineering diversity



Many software engineering methods and tools have been developed

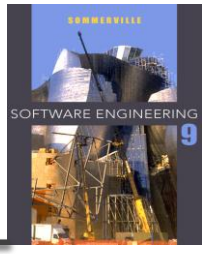
Which one should you use?

=> consider type of application

TODO:

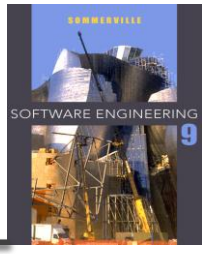
Class activity

1.1.3 Software engineering and the web



✧ Originally: web was primarily an information store

1.1.3 Software engineering and the web



- Originally: web was primarily an information store
- Around 2000 web evolved

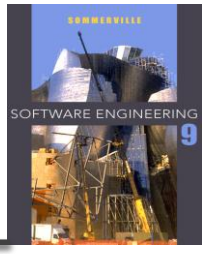
browsers added functionality

web based applications

web services

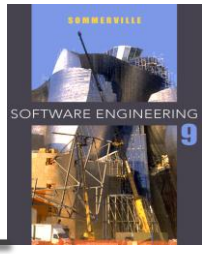
clouds

Changes brought by the web

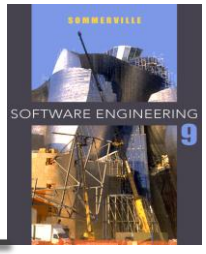


Before the web	Now
Applications mostly run on single computers	Applications run on one or more web server(s)
Typically pay for software	Software often free
Communication local	Communication global
Limited software reuse	Extensive software reuse

Web software engineering

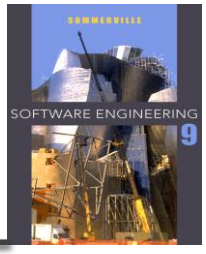


- Software reuse is the dominant approach for constructing web-based systems.
- Developed and Delivered incrementally
- User interfaces are constrained by the capabilities of web browsers.



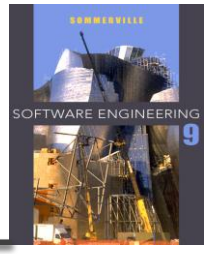
CONTINUE

1.2 Software engineering ethics

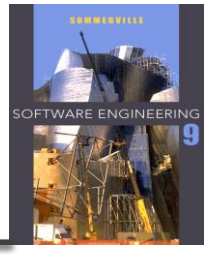


- Responsibilities beyond the application of technical skills.
- To be respected as professionals
- Legality vs morality

Issues of professional responsibility



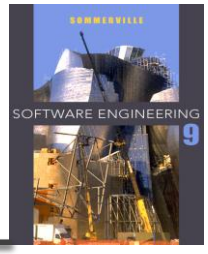
Issues of professional responsibility



Confidentiality

Competence

Issues of professional responsibility

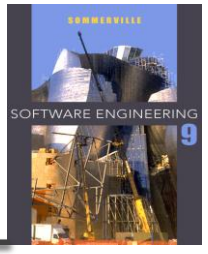


Confidentiality

Competence

Intellectual
Property Rights

Issues of professional responsibility



Confidentiality

Competence

Intellectual Property Rights

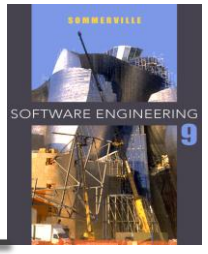
Computer Misuse

Hippocratic Oath for Scientists

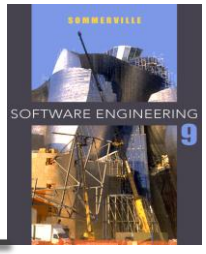
Joseph Rotblat

Physicist that worked on the Manhattan Project; Received the Nobel Peace Prize (1995) for their efforts towards nuclear disarmament

ACM/IEEE Code of Ethics

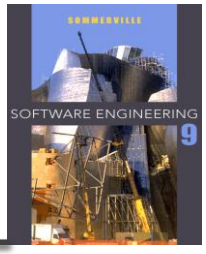


- The professional societies in the US have cooperated to produce a code of ethical practice.
- Members sign up to the code when they join.
- Rationale of the Code:
  - Central and growing role of computers and software engineers influence all aspects of software
  - Software engineers have significant opportunities to do good or cause harm or to enable / influence others to do good or cause harm.



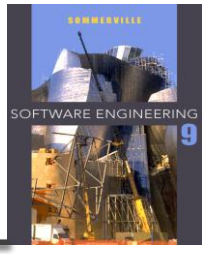
Handout Ethics Principles

Right or Wrong ?



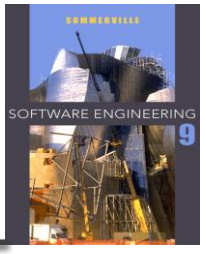
- Palestinian hacker Khalil discovered a glitch that allows anyone to post to a stranger's Facebook wall.
- After Facebook ignored his bug report he posted the site’s vulnerability on Zuckerberg's wall.

Right or Wrong ?



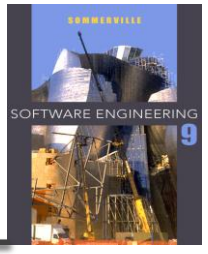
- Palestinian hacker Khalil discovered a glitch that allows anyone to post to a stranger's Facebook wall.
- After Facebook ignored his bug report he posted the site’s vulnerability on Zuckerberg's wall
- **TODOD: Right or Wrong?**

Ethical dilemmas



Your employer wants to release a safety-critical system but you know that the tests are not completed yet. Should you speak up?

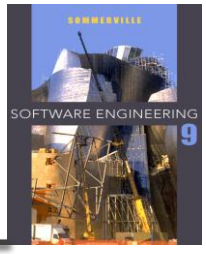
Ethical dilemmas



Your employer wants to release a safety-critical system but you know that the tests are not completed yet. Should you speak up?

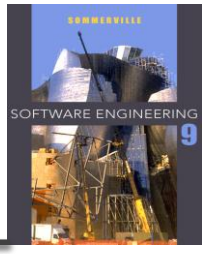
TODO:

Discuss in groups of 3 (max 4):



TODO:

Chapter 1 Review



THE END