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Launching into Cyber Security

Week 6 Seminar

Sammy Danso, PhD

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Announcement

- Collaborative discussion 2

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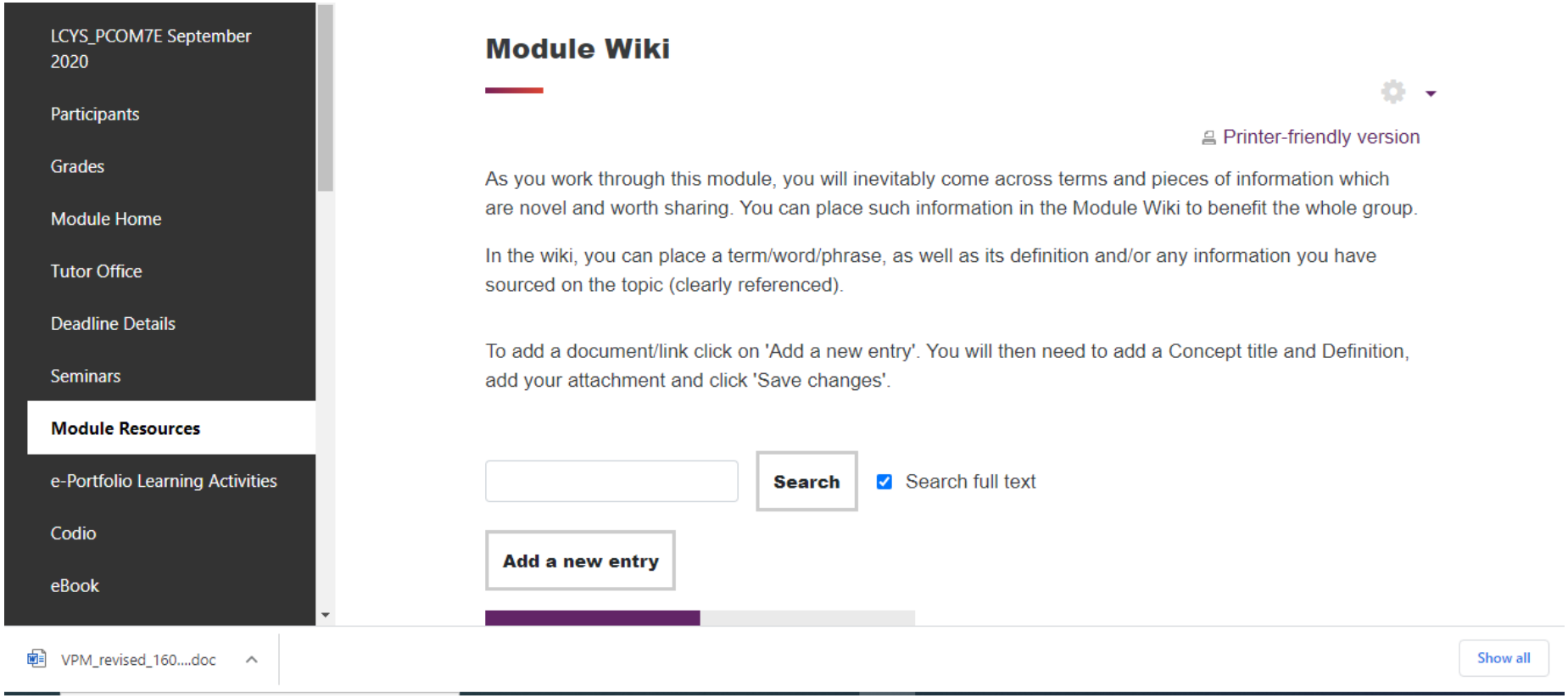
Module Wiki



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Outline

- Collaborative Discussion 1 post-mortem
- Individual Essay
- Basics of UML
- Application of UML concepts to secure design

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Collaborative Discussion 1: post-mortem

- Initial post be done within the stipulated time
- Peer response and follow-up
- Summary post
- Critical analysis and evaluation of information provided
- Referencing style
- Level of engagement
- Quality of contribution
- Word-count limits

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Individual Essay

Q & A

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This week's task

- Review the recording of seminar 2 (unit 4)
- Develop a UML diagram using the Visual Paradigm tool to model at least two of the designs discussed in the seminar

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Discussion outline

- Collaborative Discussion 1 post-mortem
- **Basics of UML**
- Application of UML concepts to secure design

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UML

- Derived from different notations used in object-oriented methods
- It is a widely used method for the modelling of complex systems
- It is an industry-standard modelling technique that combines features from different notations into a single powerful unified language
- Useful tool for communication between stakeholders
- It is NOT a programming language and also not a software development process methodology.

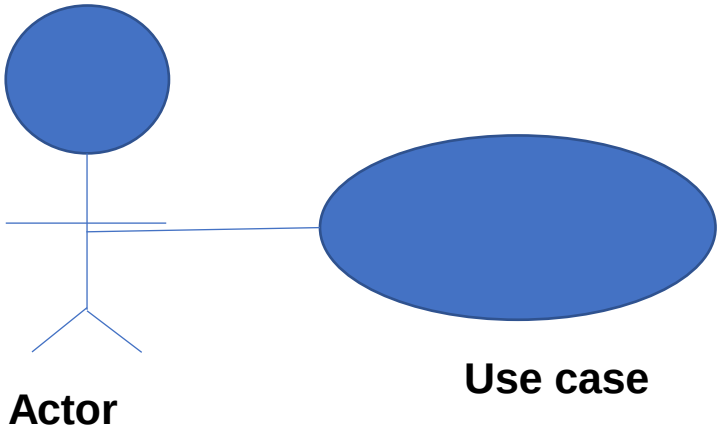
UML functional requirements model

Use case diagrams

Used during requirements elicitation and analysis to represent external behaviour.

- **Actor**

Represents a role, that is, a type of user of the system

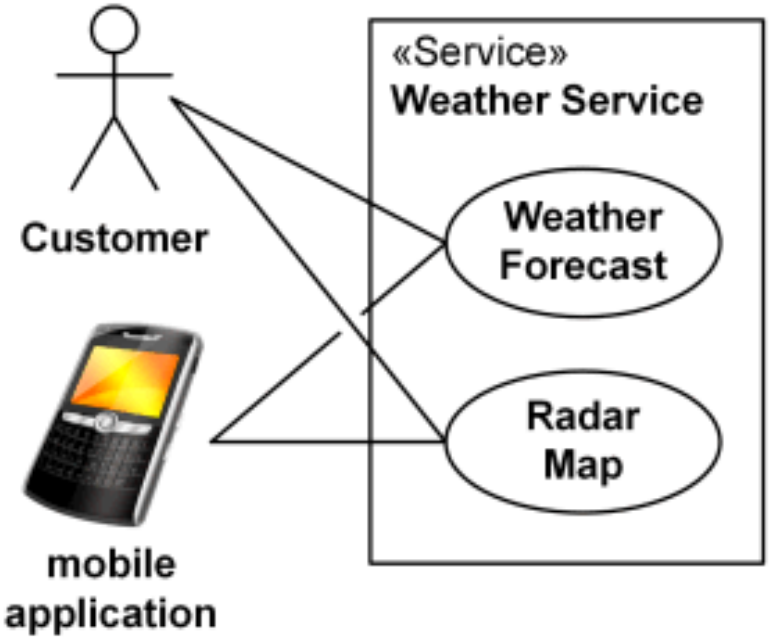


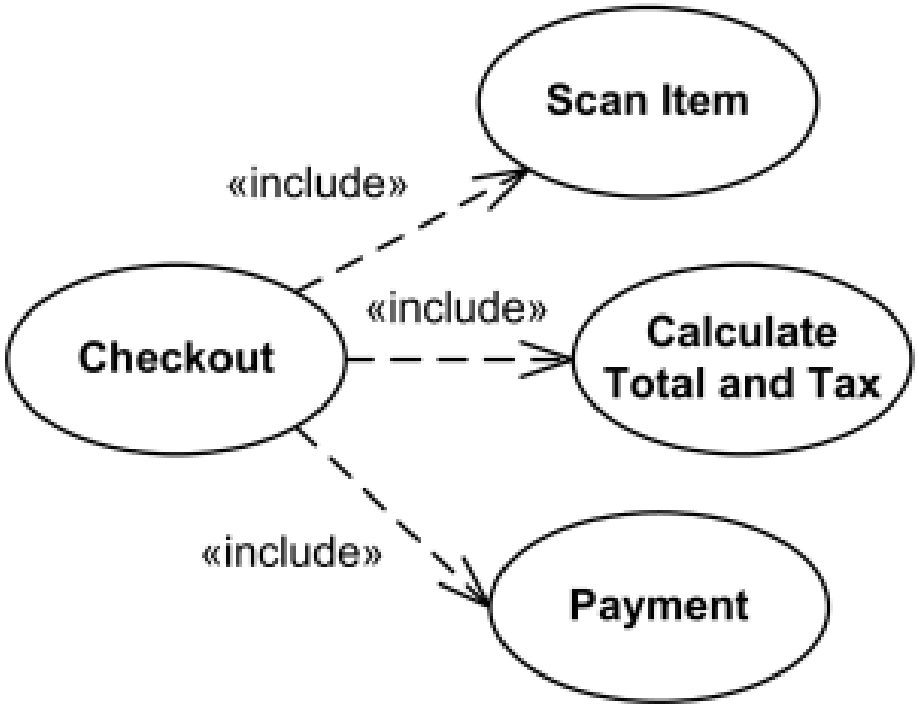
- **A use case**

Represents a type of functionality provided by the system

UML functional requirements model

Use diagrams





Source: https://www.uml-diagrams.org

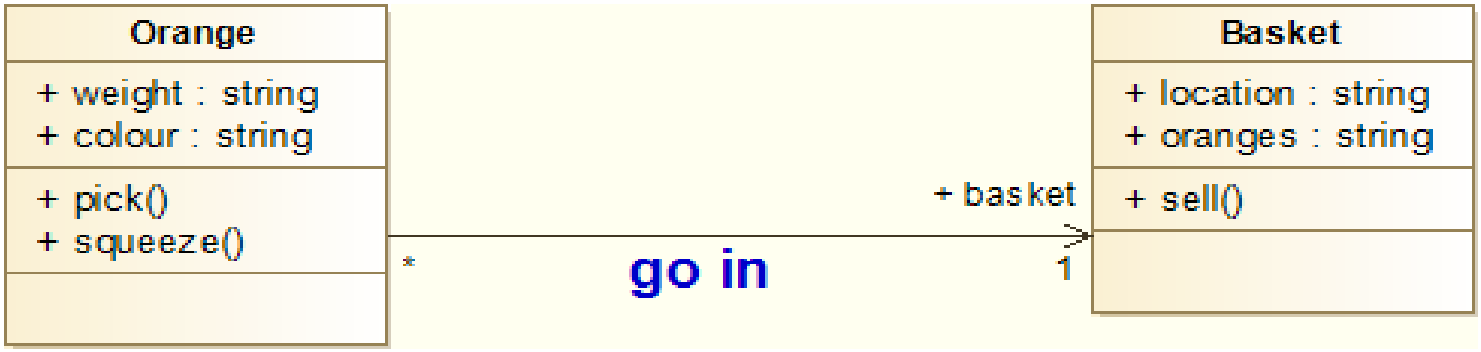
UML structural model

Class diagram

Class diagrams represent the structure of the system

Useful for:

- requirements analysis to model application domain concepts
- specifying detailed behaviour and attributes of classes



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UML functional model: Statechart diagrams

- Shows the various states a class changes within a system
- Useful for dynamic view of a system to show how functional requirements are achieved.
- Components:
  - **Initial state:** the initial state of a system or a class
  - **Transition:** solid arrow to represents the transition or change of control from one state to another.
  - The arrow is labelled with the **event** which causes the change in state.
  - **State:** represents the conditions or circumstances of an object of a class at an instant. of time.

UML behavioural models

- Used to capture interaction that defines the behaviour of a system
- It can also capture the dataflow
- Useful in identifying or finding missing objects required to complete a use case.
- A useful complement to class diagram.

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Discussion outline

- Collaborative Discussion 1 post-mortem
- Basics of UML
- **Application of UML concepts to secure design**

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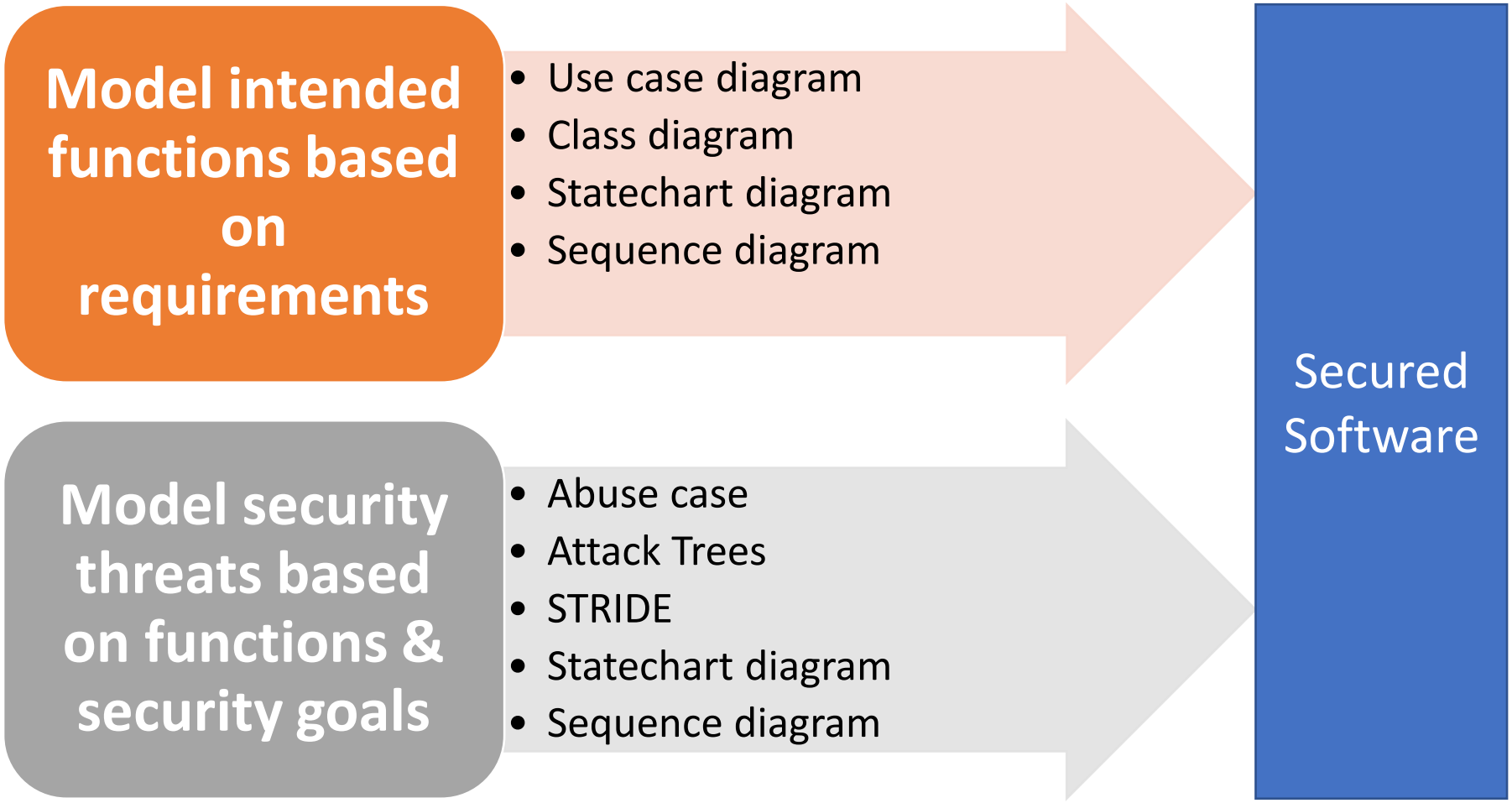
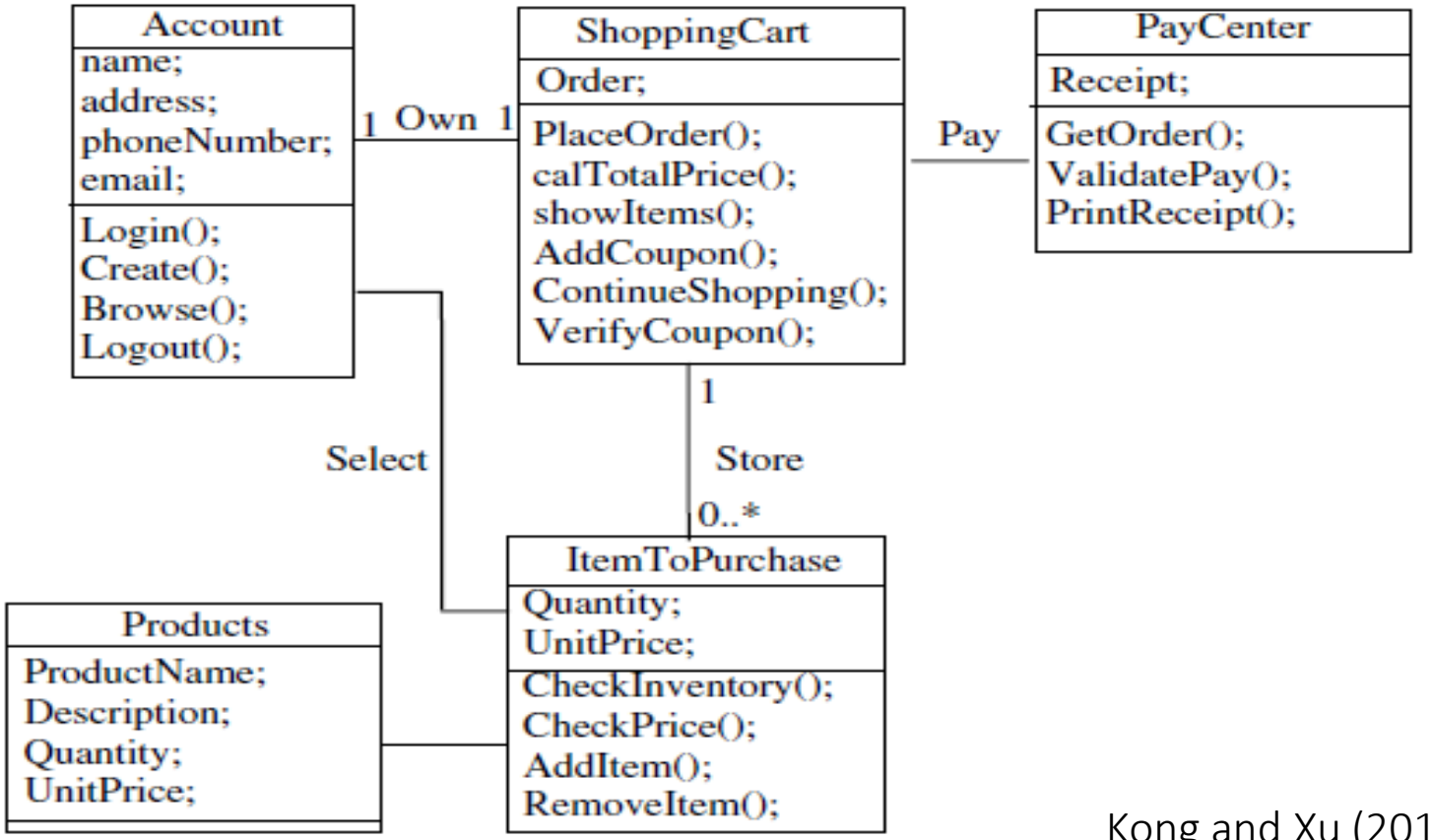
UML-based software security design



Functional model

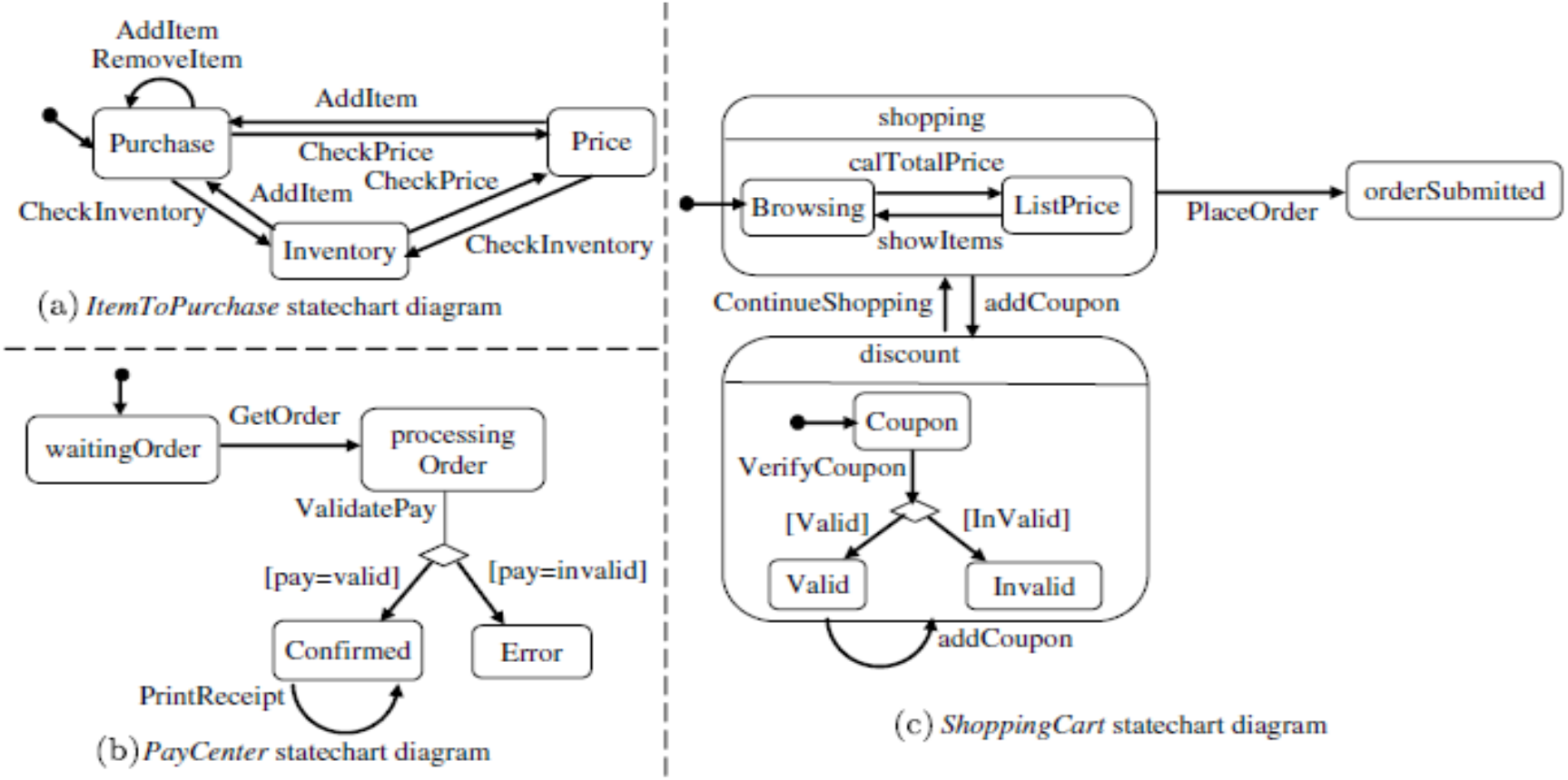
Class diagram: online shopping system



Kong and Xu (2010)

UML-based security design: functional model

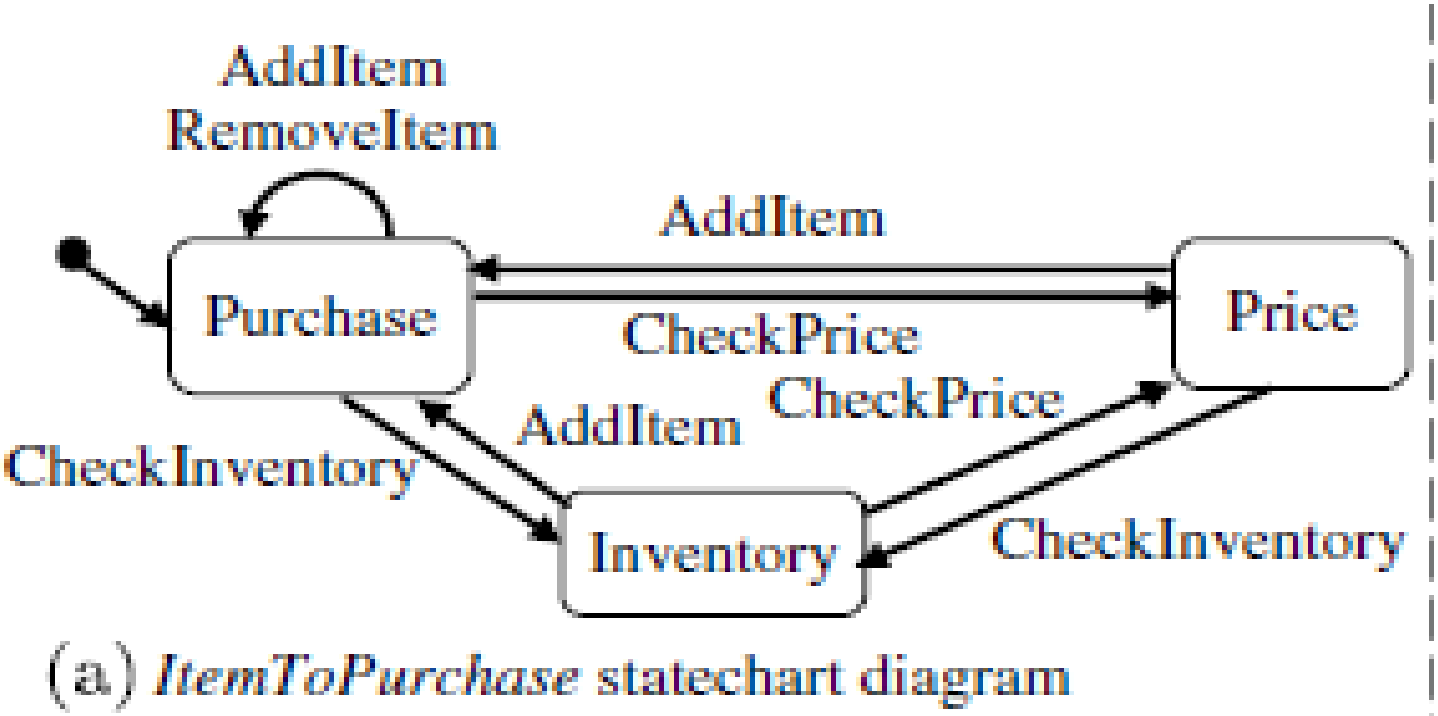
Statechart diagram: online shopping system



Kong and Xu (2010)

UML-based security design: functional model

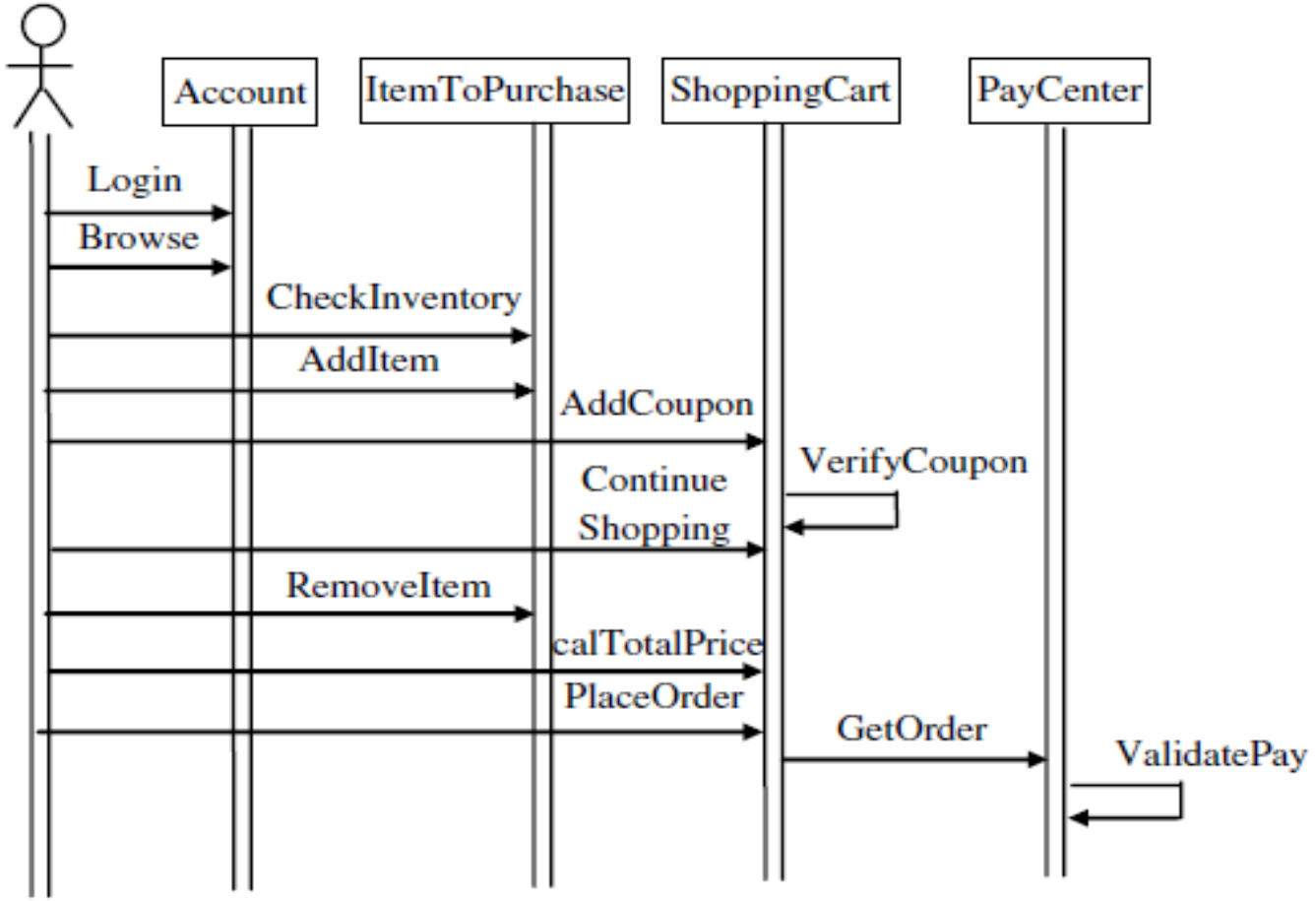
Statechart diagram: online shopping system



(a) *ItemToPurchase* statechart diagram

Kong and Xu (2010)

Behavioural model: sequence diagram



Kong and Xu (2010): The threat of buying a product at reduced price

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Discussion outline

- Collaborative Discussion 1 post-mortem
- Basics of UML
- **Application of UML to NHS PACS secure design**

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Last week's recap

Scotland's Health on the Web

Putting Scotland's Health on the Web

NHS SCOTLAND

Home | About NHS Scotland | News | Organisations | Patients | Vacancies | Sites A-Z | Contact Us

Home > Organisations > Fife

Fife

NHS Fife is working to improve health services with the involvement and support of the public and our partners in other NHS Boards, Fife Council and voluntary agencies.

Within the NHS Fife website you can find information about Fife's health services as well as details on a wide range of health topics.

Website: https://www.nhsfife.org

Coronavirus (COVID-19)

If you have concerns about Coronavirus (COVID-19) and are worried about symptoms, you must stay home and call your GP or NHS 24 (111) out of hours where you will receive help.

For the latest health information and advice please visit NHS Inform website.

Latest information on the situation in Scotland is being published by The Scottish Government.

Latest Vacancies

Privacy & Cookies Policy

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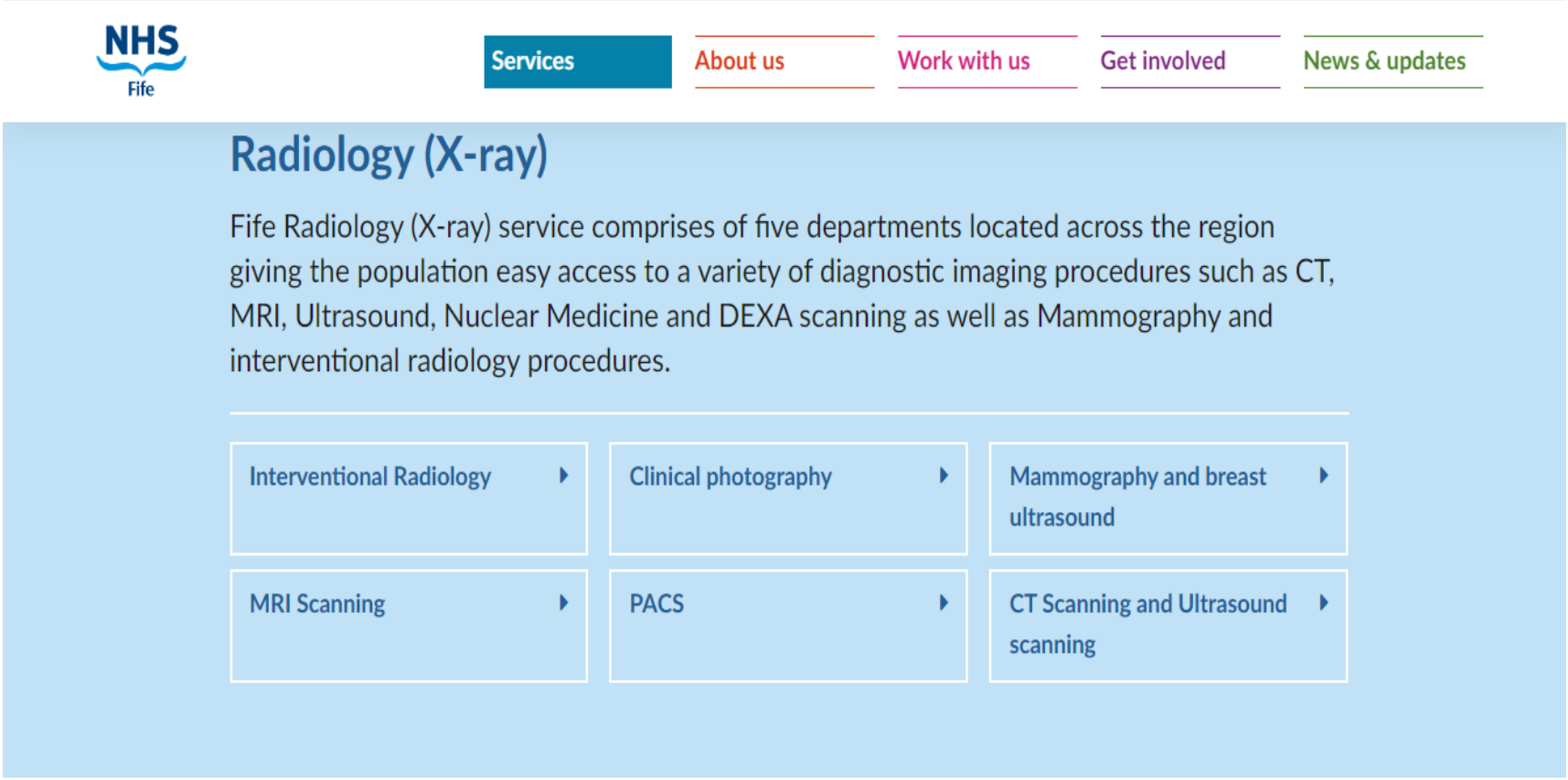
Last week's recap



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Last week's recap

Picture Archiving Communications System (PACS)

- Access to Radiology service is through a referral system
- Radiology examinations are stored and reported digitally.
- Imaging is accessed by a Consultant Radiologist and compiles a report.
- Report is sent to the health professional that made the request

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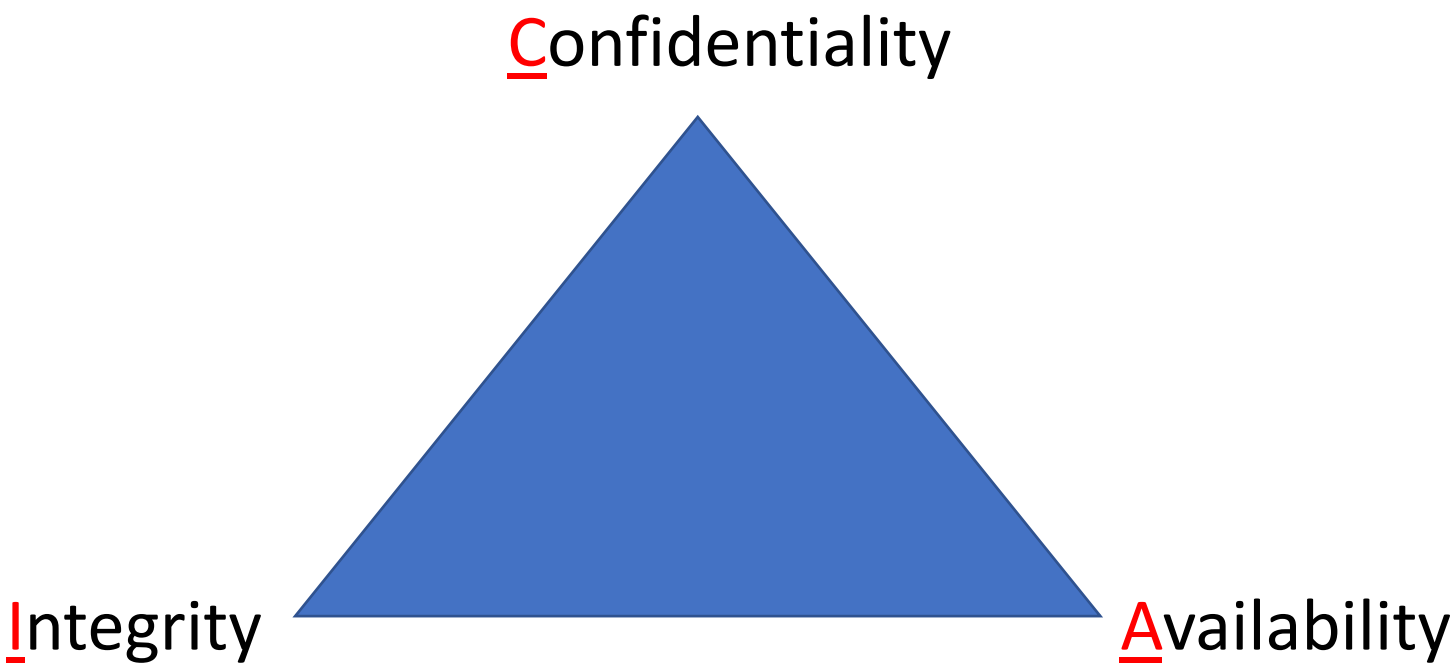
Last week's recap

Picture Archiving Communications System (PACS)

- PACS is national system – accessible across all health boards.
- Accessible by both Radiology staff and clinicians.
- You must be a doctor or be highly specialised in your clinical field to be able to read x-rays and act upon them.
- Integrates with Image Exchange Portal (IEP) for safe and secure transfer of imaging to specialised healthcare institutions around the UK.

Last week's recap: design objectives

The CIA triad model



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Last week's recap

Establish the context – determine all system components – ie have no blind spots for PACS

- Hardware
- Software
- Databases
- Networks
- People & procedures

Source: Wikipedia

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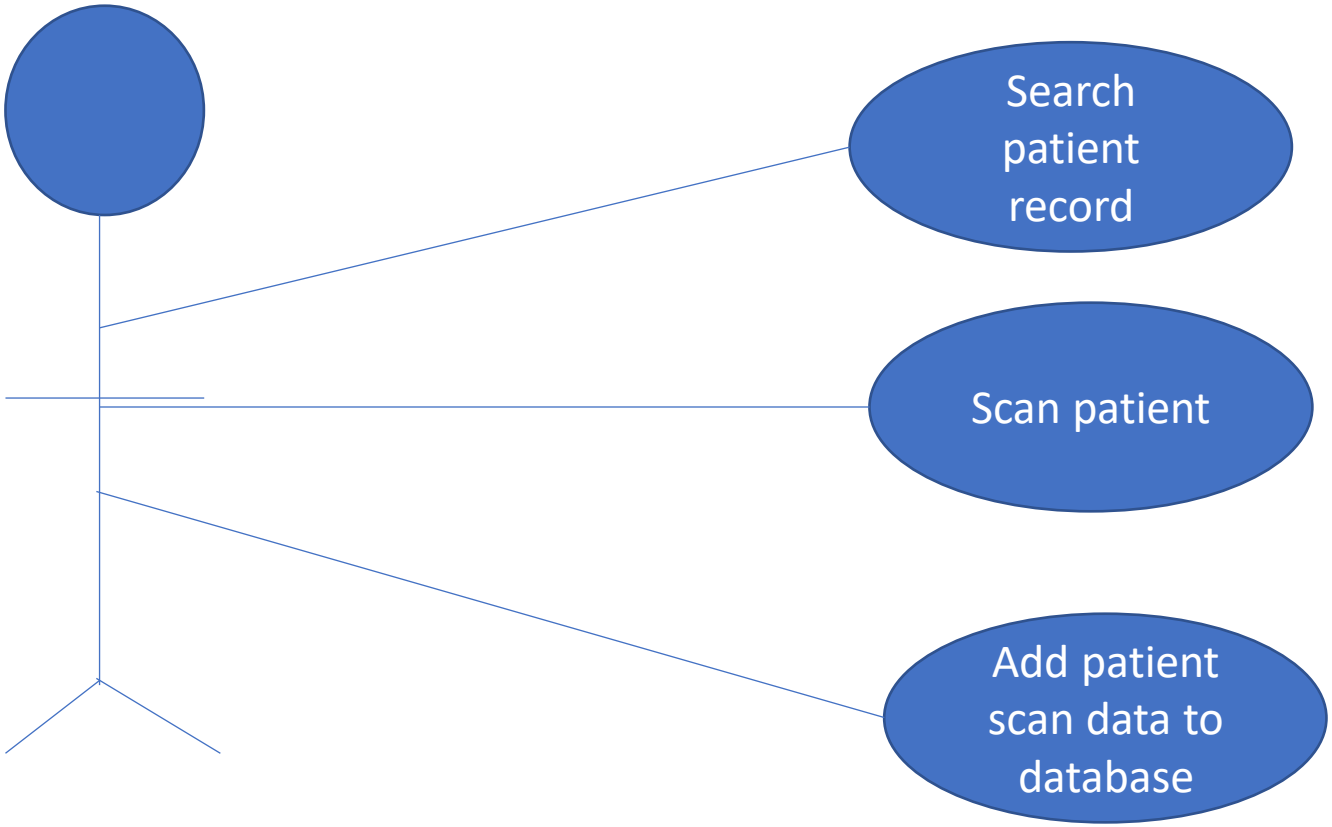
Functional requirement

Use Case



Software security requirement

The STRIDE method

Spoofing ..

- Using fake identity to gain access.

- Threat aims at authentication

Software security requirement

The STRIDE method

Tampering …a threat to data integrity

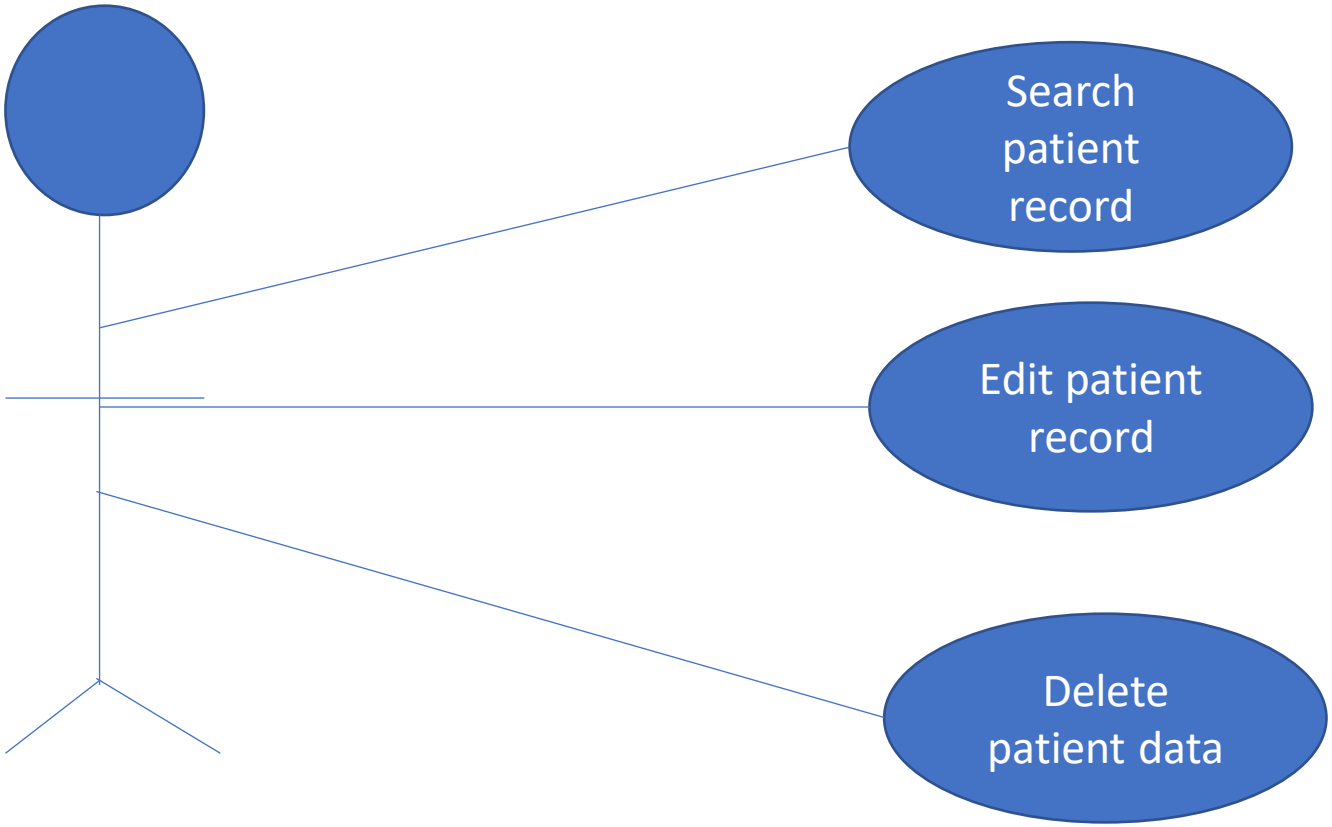
Software security requirement

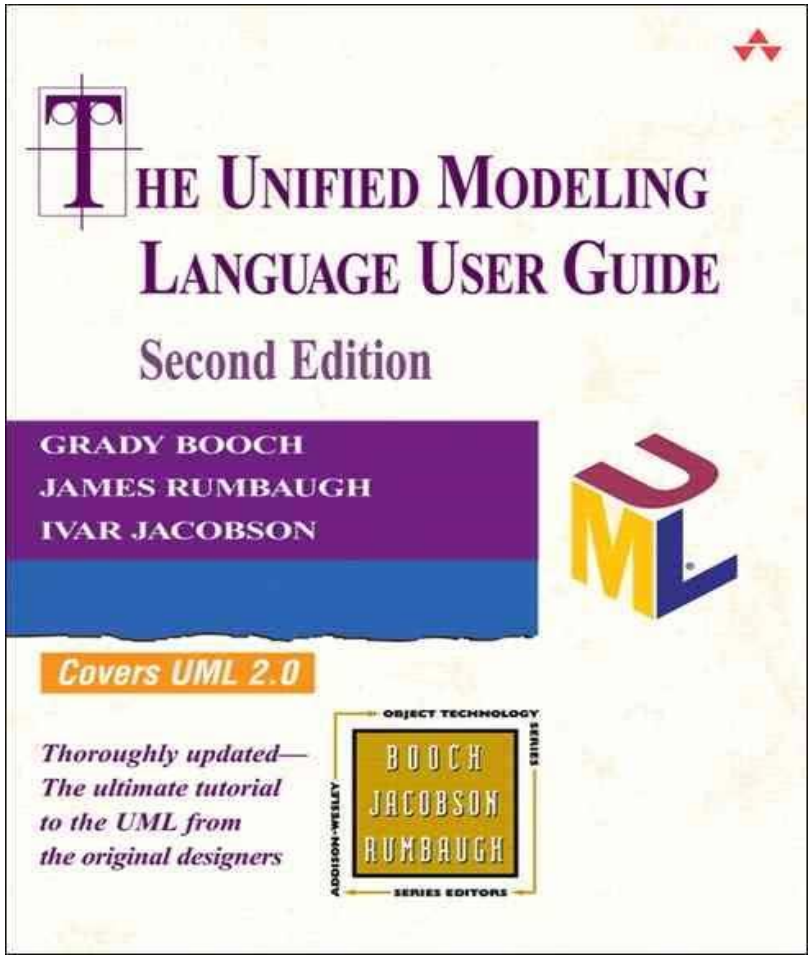
The STRIDE method

Elevation of privilege.. threat aiming at authorisation

Security requirement

Abuse case diagram




THE UNIFIED MODELING LANGUAGE USER GUIDE
Second Edition
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IVAR JACOBSON
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Covers UML 2.0
Thoroughly updated—
The ultimate tutorial
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the original designers
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Analysis tips

Identifying model components from requirement narratives

PART OF SPEECH	MODEL COMPONENT
Proper noun	**Object**
Common noun	**Class**
Doing verb	**Operation**
Being verb	**Inheritance**
Having verb	**Aggregation/Composition**
Modal verb	**Constraint**
Adjective	**Attribute**

Originally introduced by Russell Abbott (1983), made popular by Grady Booch

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Analysis tips c

Identifying model components from requirements

PART OF SPEECH	MODEL COMPONENT	EXAMPLES
Proper noun	**Object**	John
Common noun	**Class**	User, Scanner, Patient, Referral
Doing verb	**Operation**	Scan, examine
Being verb	**Inheritance**	Is a kind of, is one of either.
Having verb	**Aggregation/Composition**	Has, consists of, includes
Modal verb	**Constraint**	Must be
Adjective	**Attribute**	User type e.g radiologist

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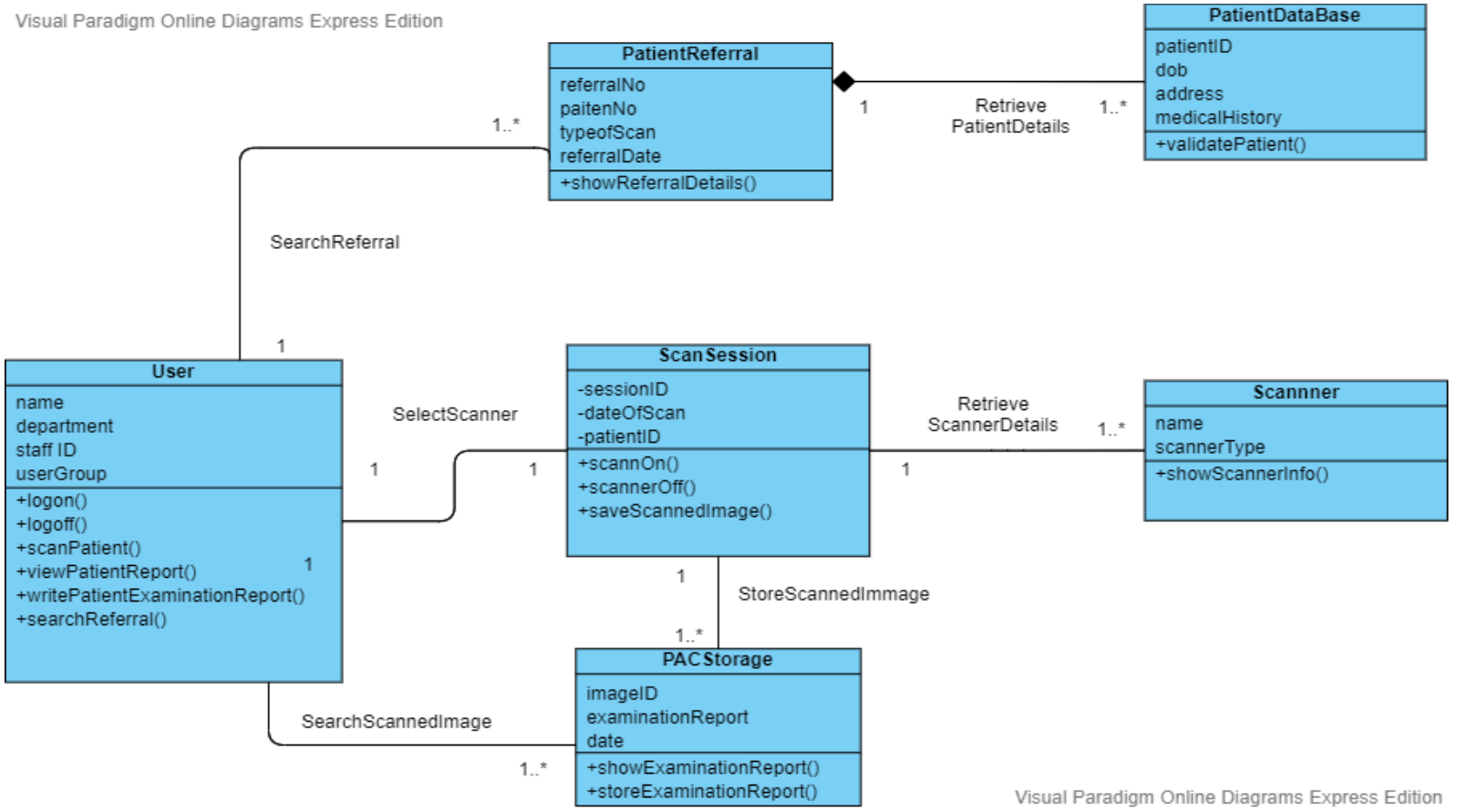
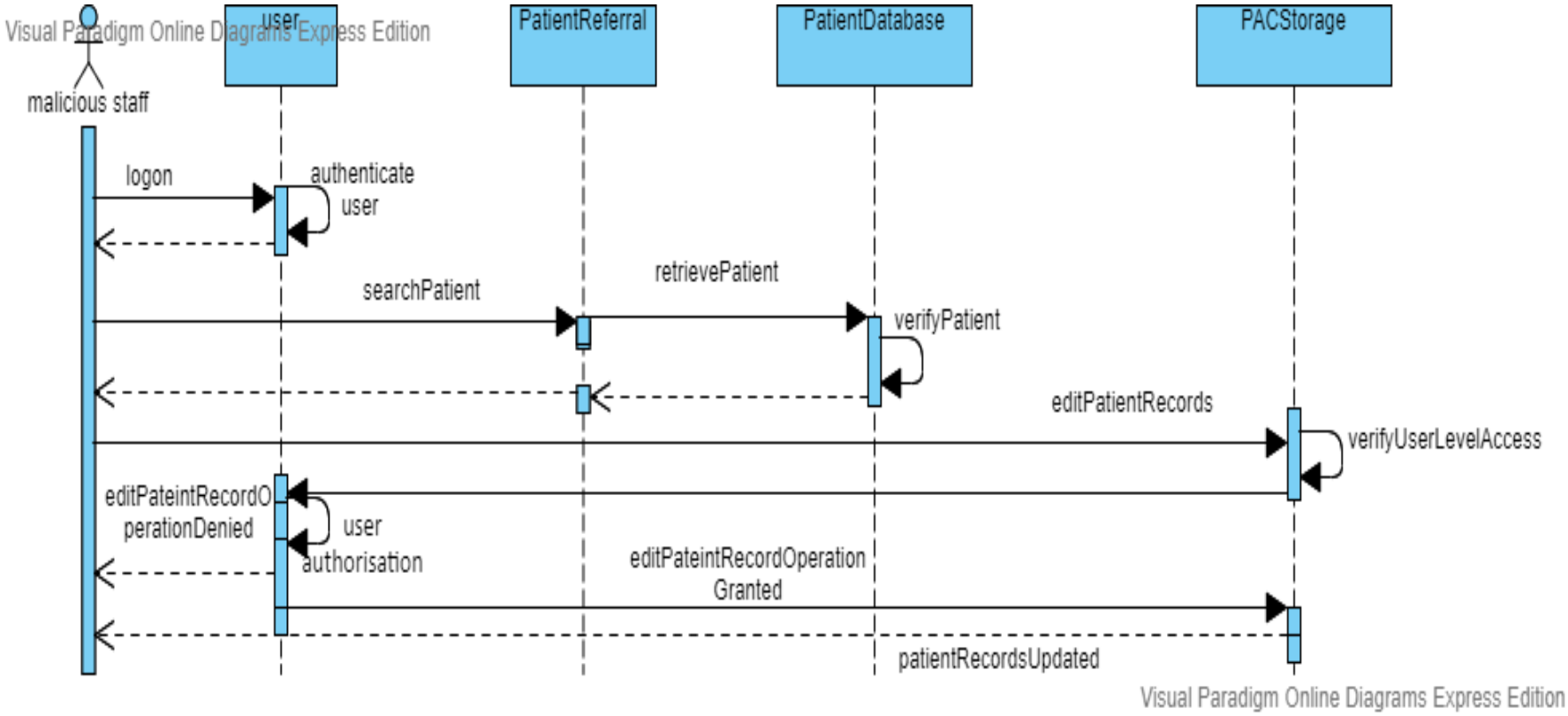
PACs structural model with inbuilt secured design



PACs behavioural model with inbuilt secured design



Exercise

- Identify an abuse case in PACS
- Model the interaction of the abuse case with inbuilt security