IFB105: Database Management

Tutorial 2 – ORM (steps 1-3)

Outline

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Tasks (CSDP step 1 ~ 3)

Part 1 – Review ORM Steps 1-3

Activity 1 – ORM

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As mentioned in the previous pages, modelling method includes "procedure" to support design a conceptual schema.

- What is the procedure for ORM?
- What does CSDP stand for?
- What is the 1st phase of CSDP and its respective steps?
- What is a fact type?

Activity 2 – CSDP Step 1

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There is a table which includes some data about Athlete and Height. You may use the table to model a conceptual schema for your “Athlete management system”.

Athlete	*Height*
Jones EM	400
Pie QT	450
Smith JA	550

* Jones is a pole player.
* Height: unit is cm.

Q. What facts you can get from the table?

Activity 3 – CSDP Step 1

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Q. What is the arity? What is the arity of the following elementary facts?

a. Employee with name ‘Tom‘ works in Department with name ‘Sales’.

b. Person with name ‘Ann’ smokes.

c. Student with name ‘Jane’ was born in the Year ‘1990’.

d. Fruit with name ‘Apple’ is harvested in the Country with name ‘Australia’ in the Month with name ‘June’.

Activity 4 – CSDP Step 2

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Draw the fact types, and apply a population check

a. **Person** with name ‘Ann’ *smokes*.

b. **Employee** “David Brown” *works* in **SoftwareGroup** “Software Maintenance”

c. The **Student** with name “John” *was awarded* the **Grade** with score code “6” for *completion of* the **Unit** with unit code “IFN554”

Activity 5 – CSDP Step 3

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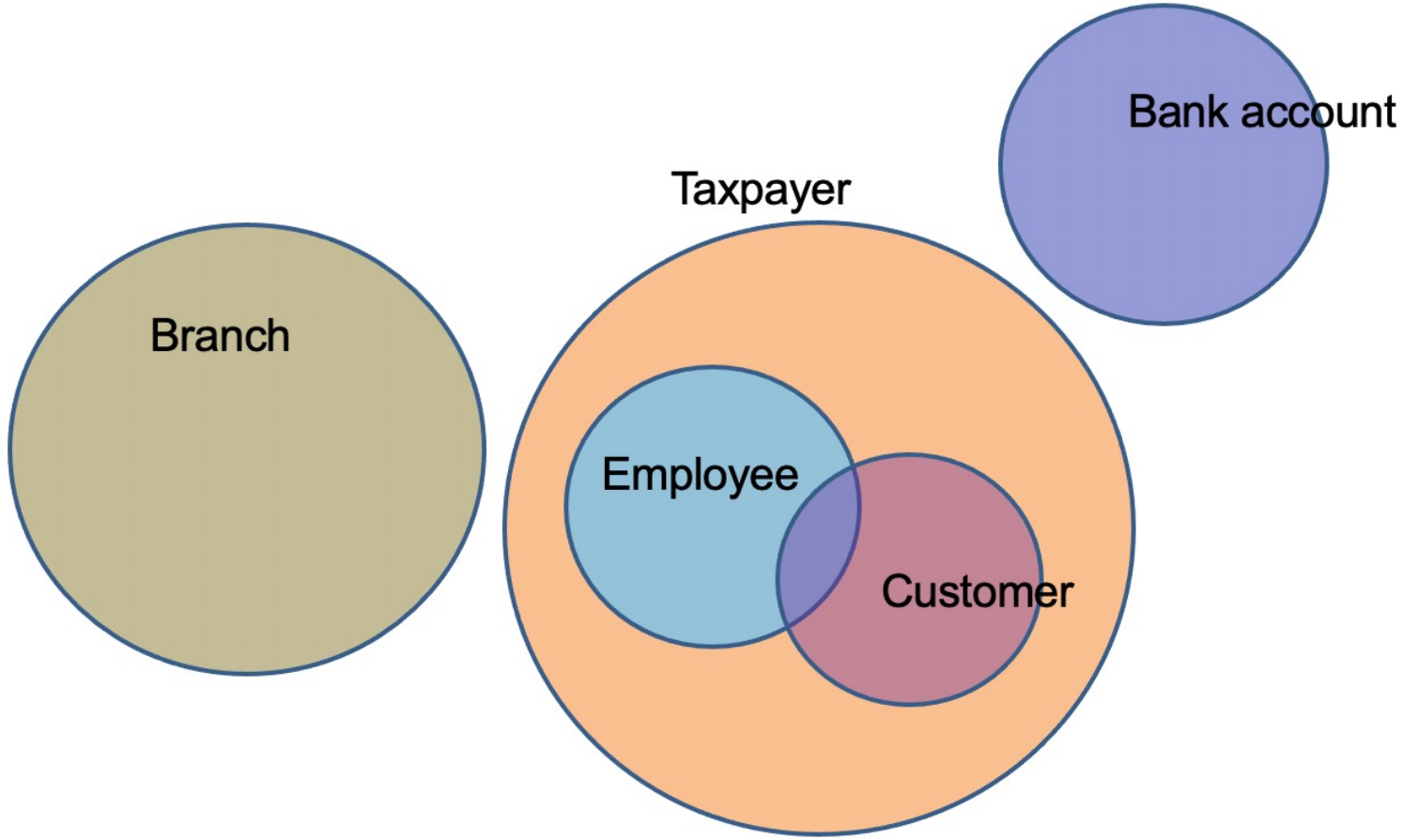
See the following diagram, and identify the primitive entity types and subtypes.



Activity 6 – CSDP Step 3

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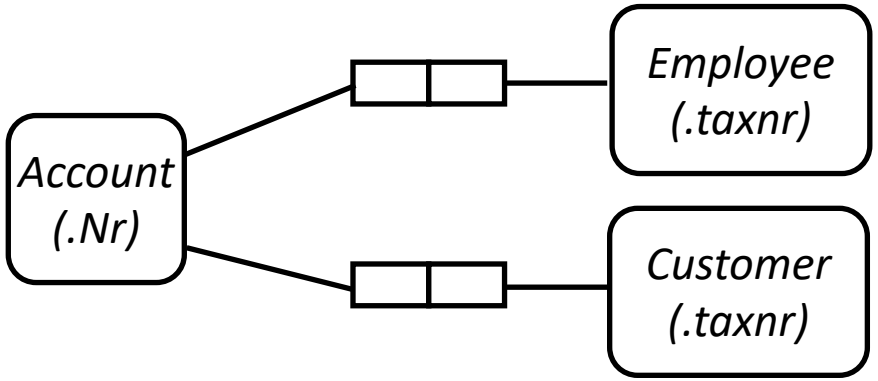
Check for entity types to be combined, and note any arithmetic derivations.

Can we simplify this diagram?



Activity 7:Nested Fact Types: Academic Results

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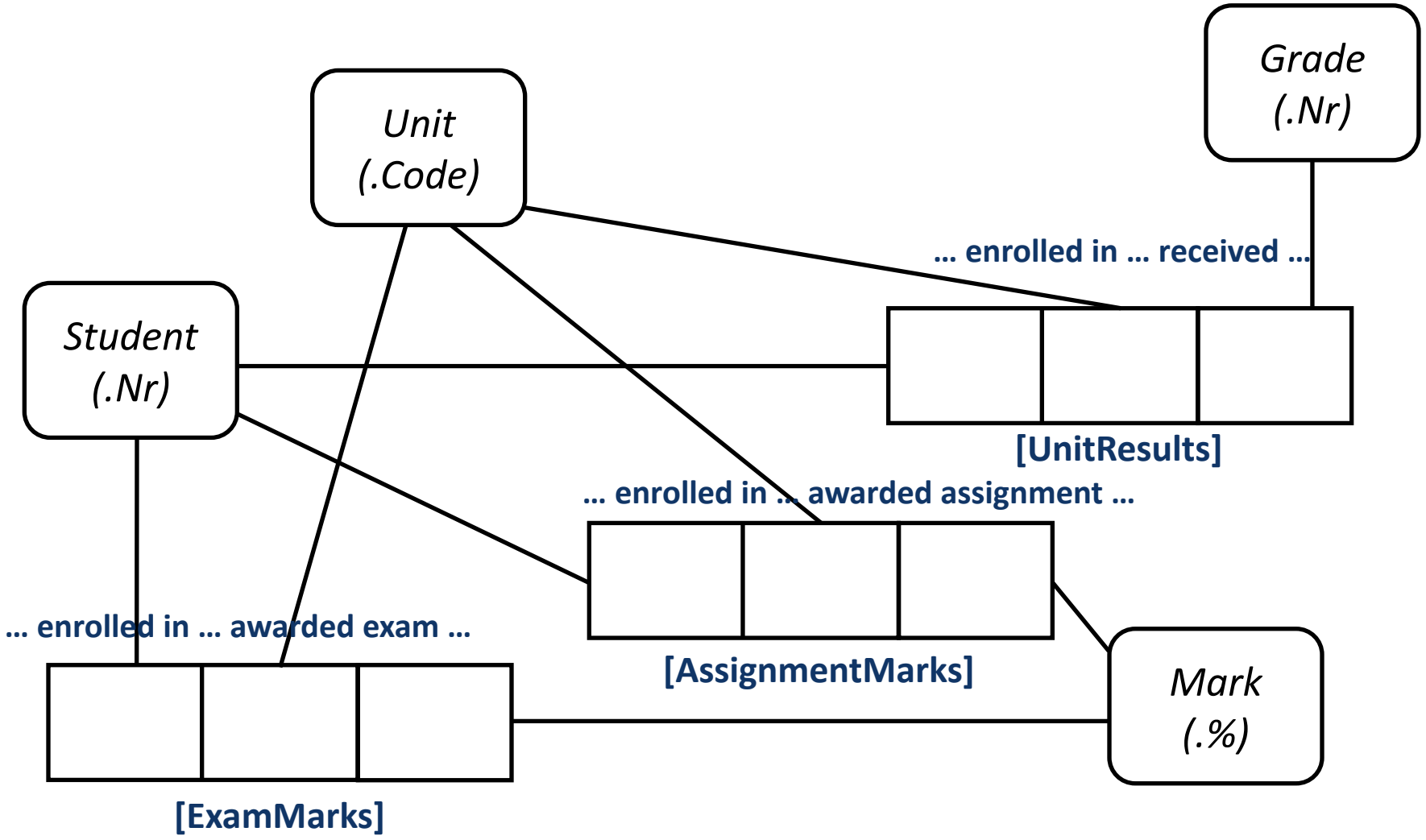
Student Nr.	Unit	Grade	Assign %	Exam %
045678	ITN100	6	40	40
045678	ITN200	6	30	43
011223	ITN300	6	30	43
123456	ITN300	4	25	25
123456	ITN400	4	39	24

Deep structure sentences (facts):

- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' received **Grade** with gradeNr of 6.
- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' awarded assignment **Mark** of mark% 40.
- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' awarded exam **Mark** of mark% 40.

Activity 7: Academic Results

Queensland University of Technology



Activity 7: Nested Fact Types - Objectification

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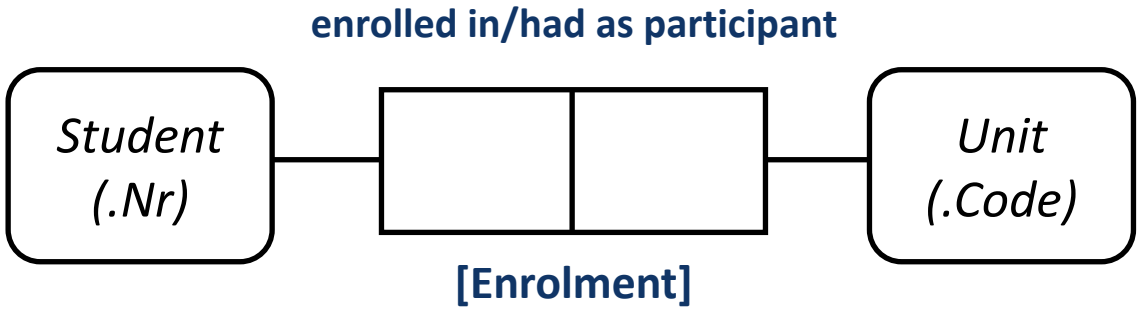
- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' received **Grade** with gradeNr of 6.
- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' awarded assignment **Mark** of mark% 40.
- The **Student** with studentNr 045678 enrolled in **Unit** with unitcode 'ITN100' awarded exam **Mark** of mark% 40.

- The **Student** with studentNr 045678 **enrolled in** **Unit** with unitcode 'ITN100'.
  - For this **Enrolment** (s)he received **Grade** with gradeNr of 6.
  - For this **Enrolment** (s)he was awarded assignment **Mark** of mark% 40.
  - For this **Enrolment** (s)he was awarded exam **Mark** of mark% 40.

Activity 7: Nested Fact Types - Objectification

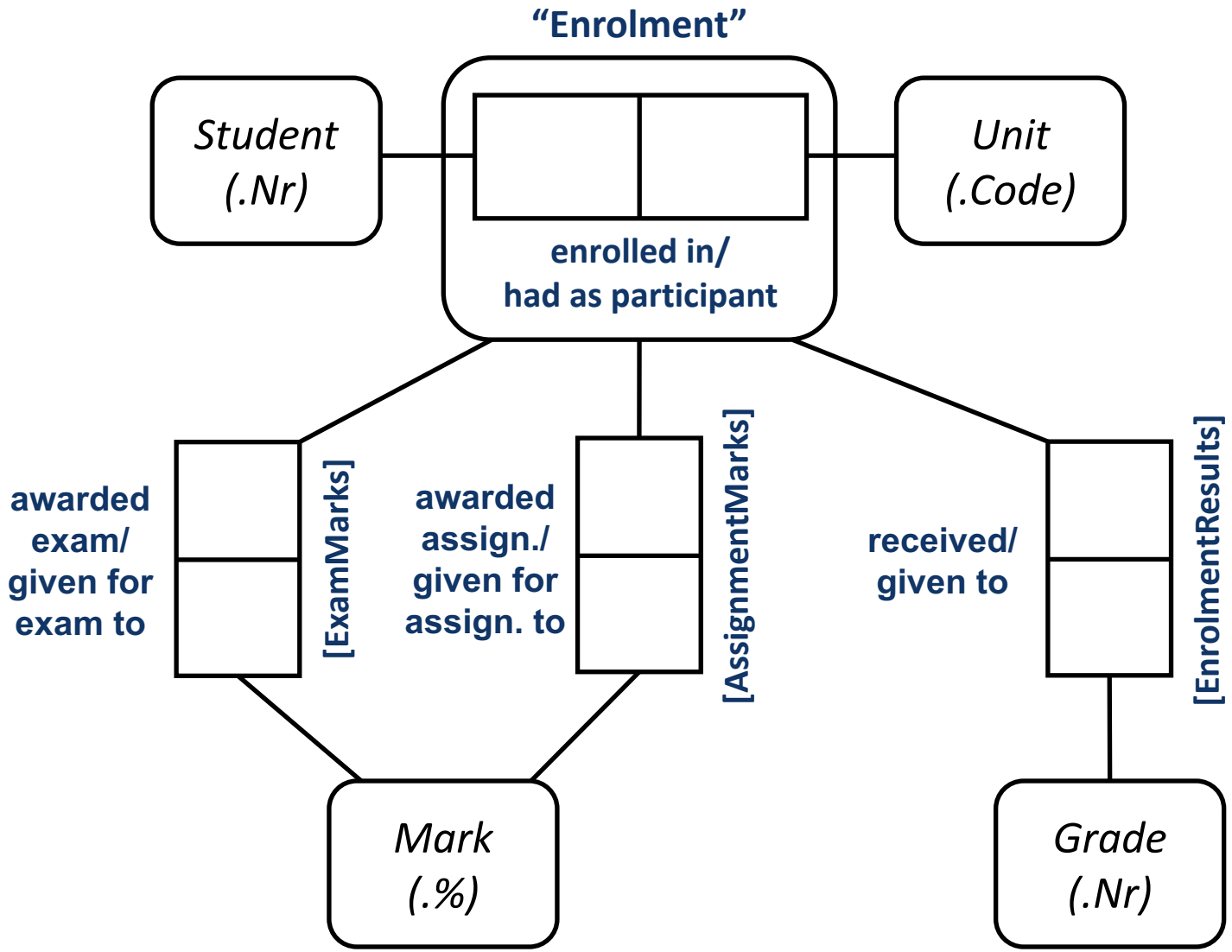
Queensland University of Technology

- The **Student** with studentNr 045678 **enrolled in** **Unit** with unitcode 'ITN100'.
  - For this **Enrolment** (s)he received **Grade** with gradeNr of 6.
  - For this **Enrolment** (s)he was awarded assignment **Mark** of mark% 40.
  - For this **Enrolment** (s)he was awarded exam **Mark** of mark% 40.

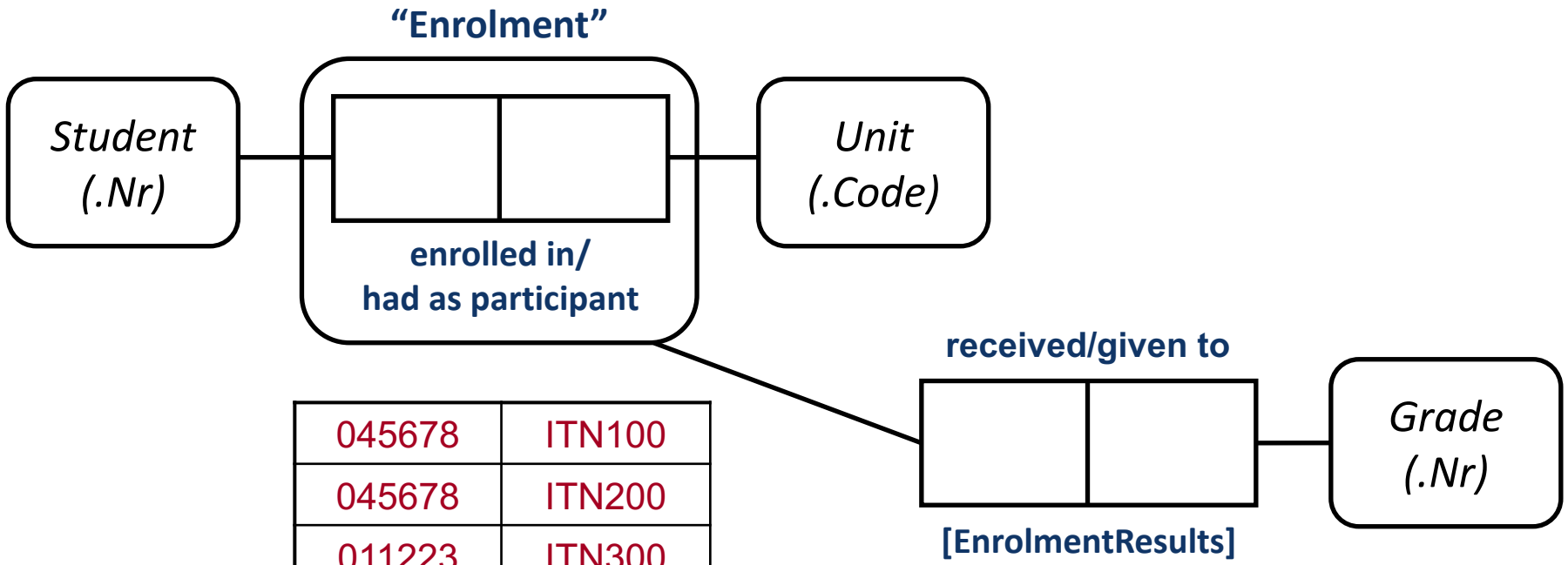


Activity 7: Nested Fact Types - Academic Results

Queensland University of Technology



Activity 7: Populate the (Nested) Fact Types



045678	ITN100
045678	ITN200
011223	ITN300
123456	ITN300
123456	ITN400

(045678, ITN100)	6
(045678, ITN200)	6
(011223, ITN300)	6
(123456, ITN300)	4
(123456, ITN400)	4

Part 2 – Exercises (ORM Steps 1 – 3)

Activity 1 – Elementary Facts

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Assuming suitable entity types and reference modes are understood, which of the following sentences express exactly one elementary fact?

a) Adam likes Eve.
b) Bob does not like John.
c) Tom visited Los Angeles and New York.
d) Tom visited Los Angeles or New York.
e) If Tom visited Los Angeles, then he visited New York.
f) Sue is funny.
g) All people are funny.
h) Some people in New York have toured Australia.
i) Who does Adam like?

Activity 2.1 – Verbalizing Elementary Facts

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Transform the familiar examples proposed in the tables below into elementary facts by verbalising them.

Athlete	***Height***
Jones EM	400
Pie QT	450
Smith JA	550

* Jones is a pole player.
* Height: unit is cm.

Activity 2.2 – Verbalizing Elementary Facts

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Transform the familiar examples proposed in the tables below into elementary facts by verbalising them.

Person	***Height (cm)***	***Birth Year***
Jones EM	166	1955
Pie QT	160	1970
Smith JA	175	1955

Activity 2.3 – Verbalizing Elementary Facts

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Transform the familiar examples proposed in the tables below into elementary facts by verbalising them.

Person	***Height (cm)***	***Year***
Jones EM	160	1970
Jones EM	166	1980
Jones EM	166	1990

Activity 2.4 – Verbalizing Elementary Facts

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Transform the familiar examples proposed in the tables below into elementary facts by verbalising them.

Parents	***Children***
Ann, Bill David, Fiona	Colin, David, Eve Gus

Activity 2.5 – Verbalizing Elementary Facts

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Transform the familiar examples proposed in the tables below into elementary facts by verbalising them.

Fruit	Country	Month
Apple	***Australia***	Jun, Jul, Aug
	America	Oct, Dec, Jan
	Ireland	Oct, Dec
Mango	***Australia***	Nov, Dec, Jan, Feb
Pineapple	***America***	Jun, Jul
	Australia	Oct, Nov, Dec, Jan

Activity 3 – Legal/Illegal CS Diagrams

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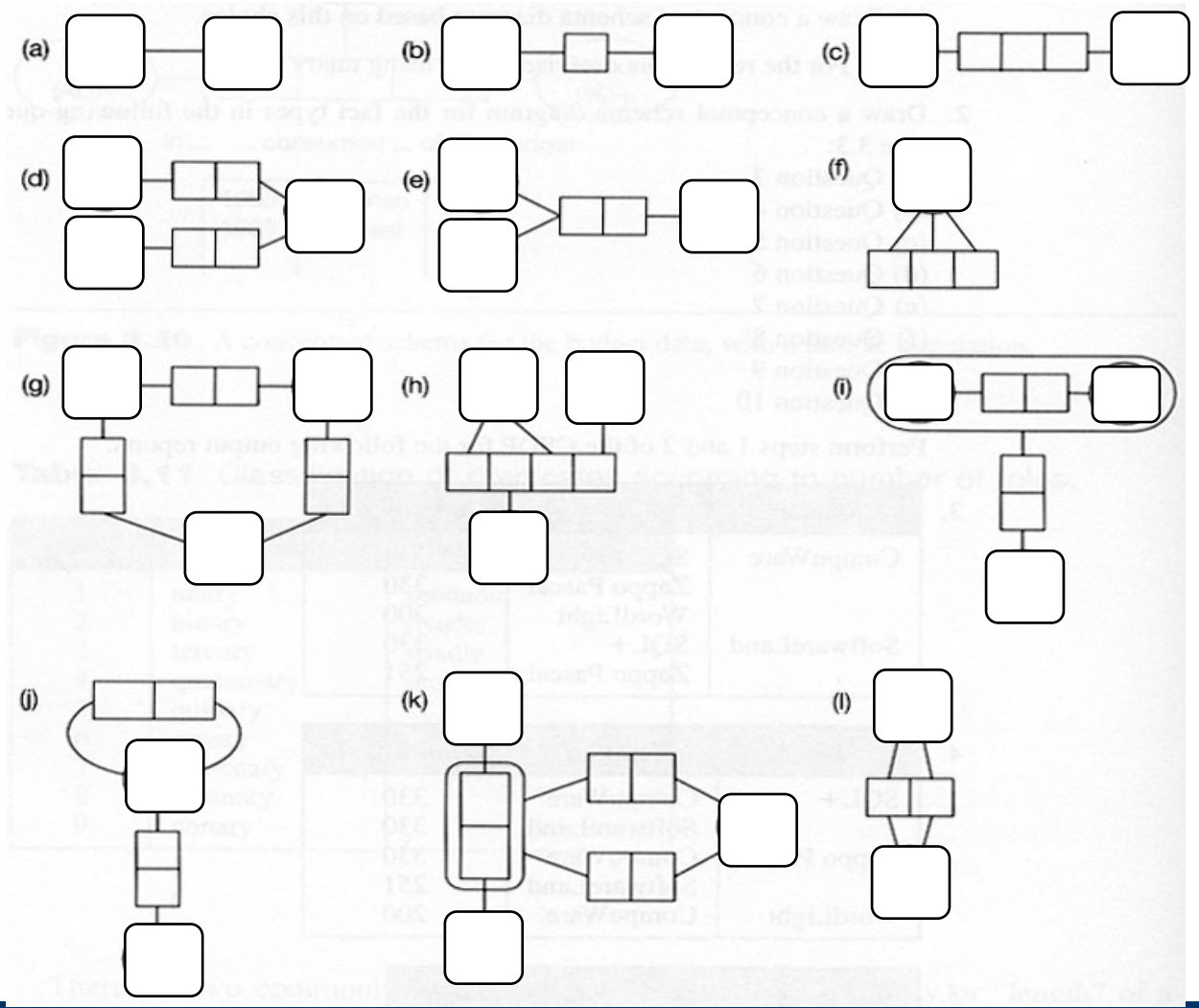
Assuming appropriate names are supplied for entity types, reference modes, and predicates, which of the conceptual schema diagrams are legal?

Where illegal, briefly explain the error.



Activity 4.1 – Drawing Conceptual Diagram

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Draw a conceptual schema diagram.

Athlete	*Height*
Jones EM	400
Pie QT	450
Smith JA	550

The **Athlete** with name ‘Jones EM’ *pole vaults* the **Height** of 400 cm.

The **Athlete** with name ‘Pie QT’ *pole vaults* the **Height** of 450 cm.

Activity 4.2 – Drawing Conceptual Diagram

Queensland University of Technology

Draw a conceptual schema diagram.

Person	***Height (cm)***	***Birth Year***
Jones EM	166	1955
Pie QT	160	1970
Smith JA	175	1955

The **Person** with name 'Jones EM' *has* the **Height** of 166 cm.
The **Person** with name 'Jones EM' *was born in* the **Year** 1955.

Activity 4.3 – Drawing Conceptual Diagram

Queensland University of Technology

Draw a conceptual schema diagram.

Person	***Height (cm)***	***Year***
Jones EM	160	1970
Jones EM	166	1980
Jones EM	166	1990

The **Person** with name 'Jones EM' *had* a **Height** of 160 cm in the **Year** 1970.

Activity 4.4 – Drawing Conceptual Diagram

Queensland University of Technology

Draw a conceptual schema diagram.

Parents	***Children***
Ann, Bill David, Fiona	Colin, David, Eve Gus

The **Parent** with firstname ‘Ann’ *is a parent of* the **Child** with firstname ‘Colin’.

The **Person** with firstname ‘Ann’ *is a parent of* the **Person** with firstname ‘Colin’.

Activity 4.5 – Drawing Conceptual Diagram

Queensland University of Technology

Draw a conceptual schema diagram.

Apple	***Australia***	Jun, Jul, Aug
	America	Oct, Dec, Jan
	Ireland	Oct, Dec
Mango	***Australia***	Nov, Dec, Jan, Feb
Pineapple	***America***	Jun, Jul
	Australia	Oct, Nov, Dec, Jan

The **Fruit** named ‘Apple’ *is harvested in* the **Country** named ‘Australia’ *in* the **Month** named ‘June’.

Activity 4.6 – Drawing Conceptual Diagram

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Draw a conceptual schema diagram, and check for entity types to be combined, and note any arithmetic derivations.

Medium	Capacity	Year Introduced	Disk Price (USD)	Cost per MB (USD)
5.25” floppy	160KB	1981	2.60	16.25
3.5” floppy	720KB	1985	3.50	4.86
Zip Drive	100MB	1995	16.65	0.17
CD-R	650MB	1996	1.79	0.003
DVD-R	9.4GB	2002	7.89	0.0008

The **Medium** with name CD-R *has* **Capacity** 650 MB

The **Medium** with name CD-R *was introduced in* **Year** 1996 CE

The **Medium** with name CD-R *has* **DiskPrice** 1.79 USD

The **Medium** with name CD-R *has* **CostPerMB** 0.003 USD