

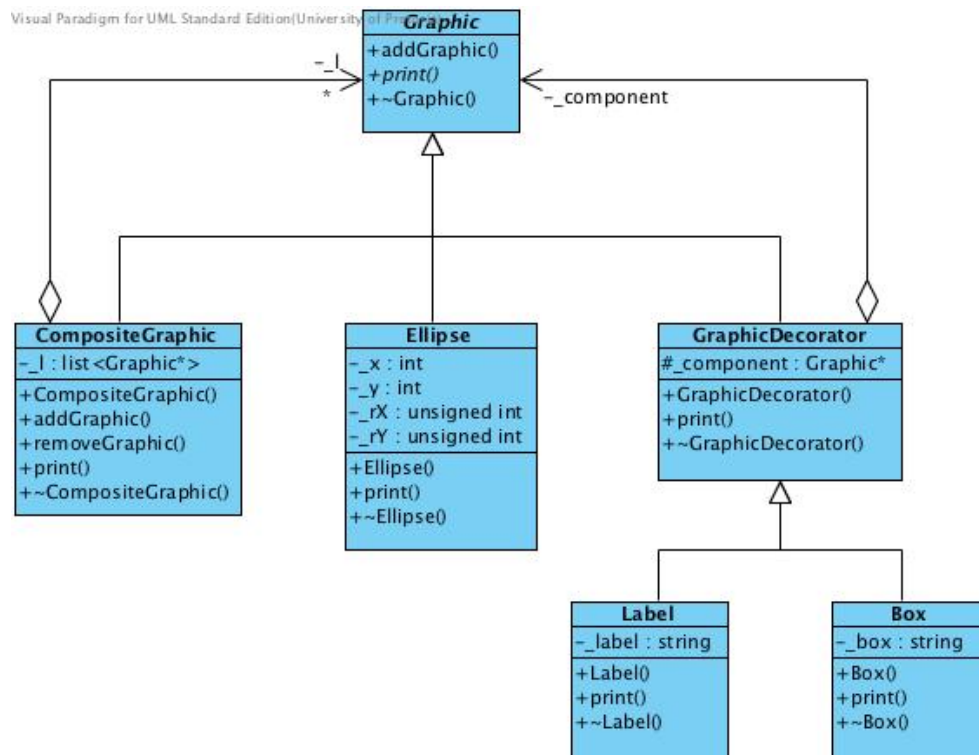


## COS 214 Tutorial 4

- This tutorial takes place on **17 September 2021**.
- This tutorial consists of **2 questions**.
- The tutorial does not contribute towards your final marks.

### Question 1: 1 ..... (35 marks)

Consider the following class diagram and answer the questions that follow.



- 1.1 Name and identify the participants of the Composite design pattern. (6)
- 1.2 Name and identify the participants of the Decorator design pattern. (8)
- 1.3 The signature for `addGraphic` is given by: `void addGraphic(Graphic*)`;
  - a) Provide the class definition for the *Graphic* class. (4)
  - b) Provide the implementation of the `addGraphic` function for the class *CompositeGraphic* (3)

c) Provide the implementation of the `print` function for the class `CompositeGraphic` (4)

1.4 Draw the sequence diagram for the following main function. (10)

```

1      int main() {
2      Graphic* g = new CompositeGraphic();
3      Graphic* e = new Ellipse(35, 35, 20, 25);
4
5      g->addGraphic(new Label(e," Ellipse"));
6      g->print();
7
8      delete g;
9      }
10
```

**Question 2: 2** ..... (18 marks)

Answer the following programming tool related questions:

2.1 What is GDB used for? (2)

2.2 Briefly explain the function of each of the following commands when executed in the gdb shell. (4)

i) `r`

ii) `s`

iii) `b fun`

iv) `info break`

2.3 What is the most common tool for Valgrind and list 3 uses for this tool. (4)

2.4 What is program profiling? (2)

2.5 Visual Paradigm is a tool used to manage a software development project. Name 6 UML diagram (6) types that are supported by Visual Paradigm?