Exercise 5

Object Oriented Programming (OOP) is based upon theories from the field of cognitive science, which is about how information is represented in the human mind. Computer scientists are particularly interested in this field because understanding human thought patterns is helpful in the field of artificial intelligence and human-computer interaction. Objects are essentially reusable software components. Almost any *noun* can be reasonably represented as a software object in terms of its attributes (e.g. name, size, and shape) and its behaviours (e.g. moving, communicating, and calculating).[1]

Object Oriented Programming has advantages over other programming styles:[2]

> Objects, once created, can often be used again in other applications or projects. Object oriented programming languages come with rich libraries of objects, and code developed during projects is also reusable in future projects. This leads to saving of development time and higher productivity.
>
> Knowledge of an objects implementation is not necessary for it to be used, meaning coders do not need to understand the details of a piece of code before using it. This allows for a relative level of parallel development that would not be available otherwise.
>
> Objects have the ability to hide certain parts of themselves from programmers. This prevents programmers from tampering with values they shouldn't. For example, another program cannot alter the account balance of a banks customer.
>
> Object Oriented Programs make for better designs with less flaws due to them forcing designers to go through an extensive planning phase. Because the coding base has been centralised, it is easier to create a maintainable procedure code. Since the design is modular, part of the system can be updated in case of issues without a need to make large scale changes. This process improves the security of the program since high levels of validation are often required.

Object Oriented Programming also has disadvantages:[3]

> Object Oriented programs are generally larger than other programs, typically involving more lines of code. This leads to programs that are typically slower than procedure based programs, as they typically require more instructions to be executed.
>
> Object Oriented programs require a lot of work to create. A great deal of planning goes into an object oriented program since the thought process involved in object oriented programming may not be natural for some people, and it can take time to get used to it. Some of the key programming techniques, such as inheritance and polymorphism, can be challenging to comprehend initially.

To summarise, object orientated programming allows you to closely model the real world since the real world has objects and objects have properties. This allows programmers to writie a set of code for a specific task, and encapsulate it all in it's own shell. That shell can then be used across different programs, it can be extended (inheritance) and overridden (polymorphed) if needed, thus allowing for a much more structured way of coding.

References

[1] Paul J. Deitel and Harvey Deitel. *Java How To Program (Early Objects)*. Pearson, 2014.

[2] Jeffrey L. Popyack. Cs 164: Fall 2015 - introduction to computer science object oriented programming: Objectives. https://www.cs.drexel.edu/~introcs/Fa15/notes/06.1_OOP/titleslide.html?CurrentSlide=0.

[3] The Saylor Foundation. Advantages and disadvantages of object oriented programming (oop). https://www.saylor.org/site/wp-content/uploads/2013/02/CS101-2.1.2-AdvantagesDisadvantagesOfOOP-FINAL.pdf.