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**Abstraction**

**Background**

* From a process perspective, abstraction is the act of bringing certain details to the forefront while suppressing all others.
* An abstraction is anything that exposures certain details that others can use and rely on.
* Some artifacts define their “public” details explicitly; others do not.
* Software abstraction requires developers to sift through large and diverse collections of details, and then determine the most salient and distinguishing concepts.

**EXAMPLE - ABSTRACTION OF “PERSONS”**

* List all the properties of persons who might be interesting to football (soccer) tournament tracking system.

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| Fast  Tall  Age  Coordination  Physical aptitude  Weight  Gender  Equipment |

**TWO COMMON PROBLEMS WITH ABSTRACTION**

* **Leaky Abstraction:**
* External characteristics are not defined as such.
* This problem can be solved with good encapsulation.
* **Over Abstraction:**
* Insufficient control given to users of the abstraction.
* Inadequate access to the information embodied in the abstraction.

**ABSTRACTION**

Abstraction is the act of summarizing or generalizing something to focus on the ideas most relevant to a conversation or certain kind of communication.

In object orientation, abstraction (the verb) is the creation of interfaces of a components, i.e., a class that exposes certain details necessary for working with that component.

An abstraction (the noun) is a description that leaves out unnecessary details.

“interfaces”, as found in C# and Java, are abstractions, but so are

abstract classe

**Adherence Criteria:**

* Meaningful labels and identifiers
* Context-aware labels and identifiers
* Explicit declaration of the full abstraction
* Abstraction sufficiency (completeness)
* Abstraction conciseness (non-redundancy)

**MEANINGFUL LABELS AND IDENTIFIERS**

* A good name must be precise, it must not be too wide or too narrow, the way of speaking must be appropriate.
* Any kind of variable name, method name, etc.) are critical to good abstraction because they impact understanding.
* Class and variable names should be nouns or noun phrases and Methods names should be verbs.

**CONTEXT - AWARE LABELS AND IDENTIFIES**

* Labels and identifiers should be redundant within the context they are declared and most often references.
* Examples from “Contacts”
* See person-only (java)/good
* See person-only (java)/poor abstraction – names not context-aware

**EXPLICIT DECLARATION OF AN ABSTRACTION**

• In object-oriented (OO) languages, the public interface for a class consists

of all the public elements (e.g., data members, methods, inner classes,

etc.)

• Some aspects of how developers use objects of a particular class cannot be captured in a class definition, e.g.,

• Constraints of the order in which methods must be called

• Constraints of specializations

An abstract class is a class that is designed to be specifically used as a base class. An abstract class contains at least one pure virtual function.

A pure virtual function is one which must be overridden by any concrete (i.e., non-abstract) derived class. This is indicated in the declaration with the syntax " = 0" in the member function's declaration.

The following is an example of an abstract class:

class AB {

public:

virtual void f() = 0;

}

• accidently exposed, e.g., when a method returns a modifiable object returns that is

**ABSTRACTION SUFFICIENCY**

* Objects (instances of classes) are intended to be used.
* A class’s abstraction represents what and how things can be done with an object.
* This adherence criterion requires the developer to ensure that users of a class can do what they need to do with the objects of that class.

**ABSTRACTION CONCISENESS**

* To reduce complexity and increase maintainability, abstractions should not contain redundant mechanisms for the same things unless they are methods.
* The methods are either required for compatibility with legacy code or are also required form an adaptor.

**Example of Abstraction Conciseness**

from abc import ABCMeta, abstractmethod

class AbstractFoo:

\_\_metaclass\_\_ = ABCMeta

@abstractmethod

def bar(self):

pass

@classmethod

def \_\_subclasshook\_\_(cls, C):

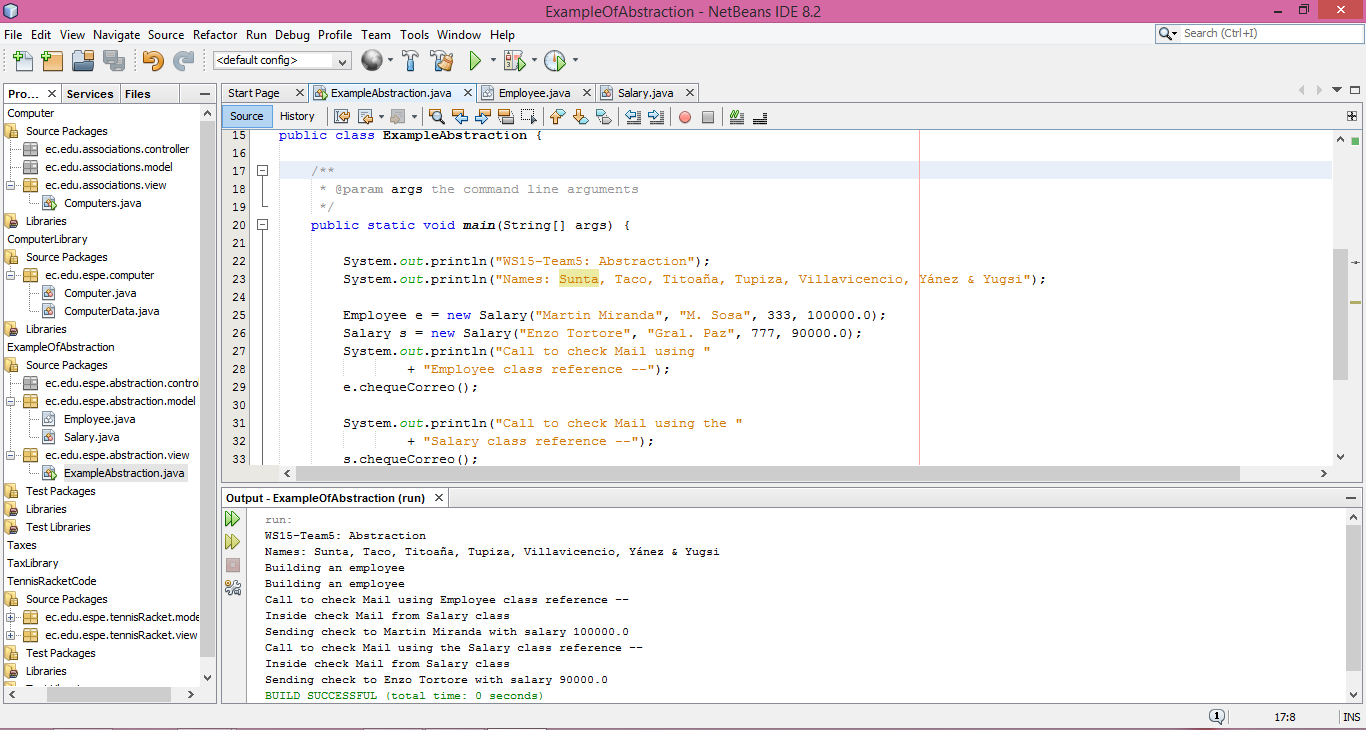
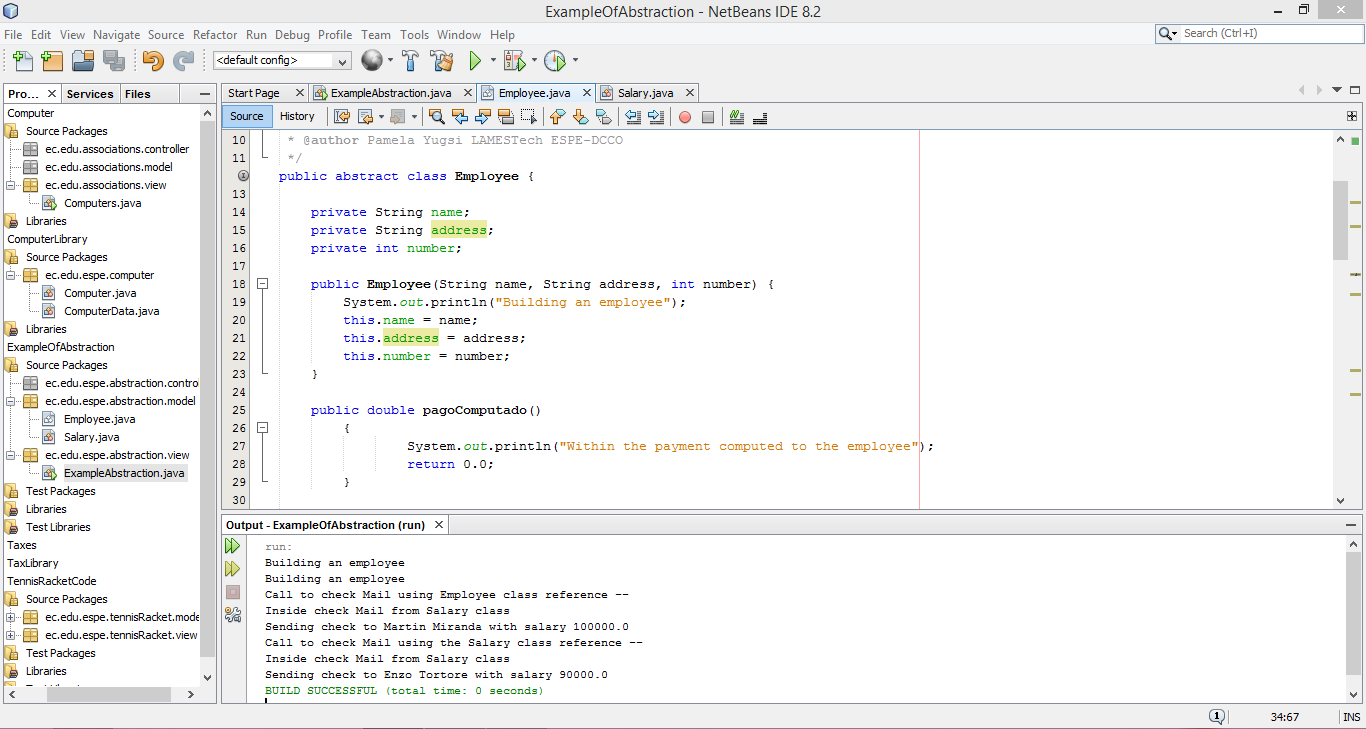
return NotImplemented

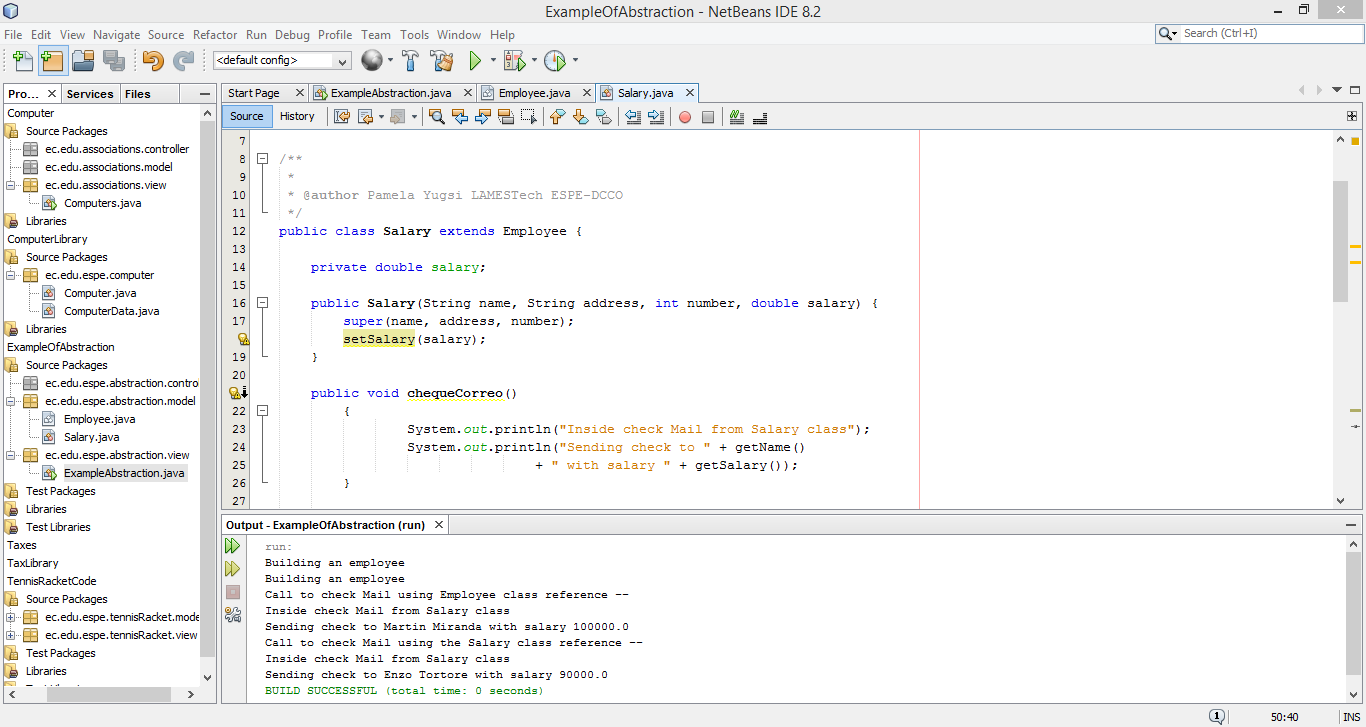
class Foo(object):

def bar(self):

print "hola"

AbstractFoo.register(Foo)

**EXAMPLE:https:** *//tinchicus.com/2019/05/23/java-abstraccion/*****

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**QUESTIONS**

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| 1. **What is abstraction?** |
| 1. It is based on another object or class, using the same implementation or behavior. |
| 1. The act of bringing certain details to the forefront while suppressing all others. |
| 1. Minimize the domino effect when software changes occur in expected (and even some unexpected) ways. |

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| **2. A ……………. includes all that is exposed to the users of the class, regardless of whether something is exposed.** |
| 1. Developer. |
| 1. Language. |
| 1. Class’s Abstraction. |

|  |
| --- |
| **3. A class’s abstraction represents what and how things can be done**  **with an ...........** |
| 1. Object. |
| 1. Class. |
| 1. Method. |

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| **4. Abstraction: Adherence criteria** |
| 1. redundancy. |
| 1. Context-aware labels and identifiers. |
| 1. labels and identifiers without text. |

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| **5. What is the difference between an abstract class and a normal class?** |
| 1. An abstract class must have at least one abstract method |
| 1. An abstract class must have at least three conventional attributes |
| 1. An abstract class and a normal class differ in their methods and attributes |