**Business case**

**Simulating an LGV System**

**The Case:**

**Setting:**

Your company “**Xtreme Software Builders**” have been contacted to design a Controlling Software for an industrial LGV System that manages the operations between all the machines present in the system.

This system is based on the following elements:

1. **Furnace** : mechanical machine that presents as its output a box of tiles
2. **Wrapper** : mechanical machine that receives in input a box of tiles and wraps it with a plastic box (to make all the tiles more stable). Then presents in output the same box ready to be picked up.
3. **LGV** : mechanical robot that moves around the system picking up box from one place and depositing it in a different place (it is an Autonomous robot that works without human intervention).
4. **Park** : empty space that will contain boxes deposited by LGV robot.
5. **Supervisor** : software system that manages all the machines and produces order for the LGV robot to move a box from one place to another.

**System Functioning**

The system to control is based on the elements above described and works as follow:

* **Furnace** : it produces as output a box of tiles that needs to be moved to Wrapper machine or to the Park depending on the temperature of this box :
  + If Box\_Temp < 100 C 🡺 it has to be moved to the Wrapper
  + If Box\_Temp >= 100 C 🡺 it has to be moved to the Park

This machine can be represented using the following information:

* ID (identifier) [int]
* Temperature [int]
* Box\_To\_PickUp [bool]

* **Wrapper** : it is a machine that is used to put a plastic cover around the box to make all the tiles more stable. It presents two points:
  + Input : to receive a box deposited by the LGV robot
  + Output : to present a wrapped box ready to be picked up by LGV robot

This machine can be represented using the following information:

* ID (identifier) [int]
* Box\_In\_Input [bool]
* Box\_In\_Output [bool]

* **Park** : space where LGV deposit boxes coming from Furnace or Wrapper. Its maximum capacity is 30 Boxes

This element can be represented using the following information:

* ID (identifier) [int]
* Max\_Capacity = 30

* **LGV** : it is a robot that picks up a box from Furnace or Wrapper and deposit it in the Park. The information to make this robot moving are Source (pick up point) and Destination (deposit point) provided by the Supervisor software

This machine can be represented using the following information:

* Source [int]
* Destination [int]
* At\_Source [bool]
* At\_destination [bool]

* **Supervisor** : it is the “master” software responsible to interact with all the elements present in the system and provide the LGV with the information about the operation to execute, that is where to pick up and where to deposit

This element can be represented using the following information:

* It receives signals from Furnace and Wrapper for box to pick-up
* It creates a mission for LGV (provides Source and Destination)
* It provides a Mission Control :
  + - * It simulate the LGV at the Source (pick-up)
      * It simulate the LGV at Destination (deposit)

**NOTE** : the Supervisor software starts a MISSION for LGV only if receives a request from Furnace or Wrapper

As Software Engineer, you have to implement the corresponding software in Java programing language to manage the LGV System.

**Requirements**:

Provide a **detailed description** about your application functioning and all the **data structures (Classes you need to represent all the elements for the System)** used for this project.

**For this project you have a lot of freedom, so you can make any assumption you want to make the final implementation easier for you BUT you have to document and explain the reason why you made this assumption.**

***GENERIC ASSESSMENT CRITERIA AND MARKING STANDARDS***

***LEVEL 5***

|  |  | ***70%+*** | ***60-69%*** | ***50-59%*** | ***40-49%*** | ***0-39%*** |
| --- | --- | --- | --- | --- | --- | --- |
| **Specific Learning Outcomes** | ***Generic Learning Outcomes*** | *Work of a distinguished quality* | *Work of a commendable category* | *Sound work* | *Broadly satisfactory work* | *Work that falls short of the threshold standards* |
| ***1. 1. Critically discuss different symptoms.***  ***2. Discuss interrelationships between physical and laboratory findings***  ***3.Evaluate prognosis***  ***4.Discuss the importance proper treatment*** | ***Knowledge and Understanding*** | Provides a broad and detailed knowledge of major theories of the discipline(s) and a distinguished grasp of a variety of ideas, contexts and frameworks. | Provides a strong detailed knowledge of major theories of the discipline(s) and an assured grasp of a variety of ideas, contexts and frameworks. | Provides a firm and detailed knowledge of major theories of the discipline(s) and a sound awareness of a variety of ideas, contexts and frameworks with no serious inaccuracies. | Provides a broadly satisfactory knowledge of major theories of the discipline(s) and a broadly satisfactory awareness of ideas, contexts and frameworks with no serious inaccuracies. | Fails to display an adequate knowledge of relevant theories, ideas, contexts and frameworks. Work contains an unacceptable level of misunderstanding of key concepts, principles and theories. |
| **Conceptual-isation and Critical Thinking** | Demonstrates a rigorous and broad grasp of relevant principles, concepts and competing perspectives and clearly identifies and communicates these effectively. | Demonstrates a strong grasp of relevant principles, concepts, and competing perspectives and clearly identifies and communicate these effectively. | Demonstrates a firm grasp of relevant principles concepts, and competing perspectives and the ability to identify and communicate these. | Demonstrates an adequate grasp of relevant principles and concepts. | Limited grasp of relevant principles and concepts. |
| **Problem Solving, Research and Enquiry** | Uses discipline-related resources in a confident and distinguished manner. Manages information (including referencing resources), collects appropriate data from an extensive range of resources and develops strong research and problem solving strategies. | Uses discipline-related resources a commendable manner. Manages information (including referencing resources), collects appropriate data from a wide range of resources and develops strong research and problem solving strategies. | Uses discipline-related resources in a sound manner. Manages information (including referencing resources), collects appropriate data from a range of resources and develops appropriate research and problem solving strategies. | Uses discipline-related resources but with some limitations. Manages information (including referencing resources), collects appropriate data from a limited range of resources and develops appropriate research and problem solving strategies. | Fails to use discipline-related resources in an adequate manner. Fails to demonstrate an adequate ability to manage information (including referencing resources), collect appropriate data and undertake research tasks or solve problems. |
|  | **Synthesis and Creativity** | Demonstrates a strong and sustained ability to synthesise and use creative solutions to solve problems. | Provides clear evidence of synthesis and creativity in problem solving. | A sound ability to synthesise and collect information to solve problems | Can adequately compare alternative methods and techniques for obtaining information to solve problems. | Fails to provide an adequate level of synthesis. |
| **Analysis and evaluation** | Demonstrates a strong sustained ability to analyse and synthesise in a considered manner. Develops authoritative arguments and judgements appropriate to the field of study. | Clear evidence of strong and considered evaluation and analysis. Demonstrates a commendable appreciation of the complexity of the issues. | Provides sound evaluation and analysis using a variety of standard techniques. Demonstrates a sound appreciation of the complexity of the issues. | Selects appropriate techniques of analysis and evaluation and provides broadly satisfactory evaluation of the relevance of collected data/evidence. | Fails to provide an adequate level of evaluation and analysis. |
| **Ethical awareness and application** | Where appropriate demonstrates a very strong awareness of the wider social and environmental implications of area(s) of study and is able to debate these issues strongly and competently in relation to more general ethical perspectives. | Where appropriate demonstrates a commendable awareness of the wider social and environmental implications of area(s) of study and is able to debate these issues strongly in relation to more general ethical perspectives. | Where appropriate demonstrates a sound awareness of the wider social and environmental implications of area(s) of study and is able to debate these issues in relation to more general ethical perspectives. | Where appropriate demonstrates adequate awareness of the wider social and environmental implications of area(s) of study and is able to satisfactorily debate these issues in relation to more general ethical perspectives | Fails to demonstrate adequate awareness of the wider social and environmental implications of area(s) of study and is unable to debate these issues adequately. |