UNIVERSITY OF WESTMINSTER

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University of Westminister

BEng (Hons) Software Engineering

School of Computing

Formal Methods

6SENG005W

Individual Report

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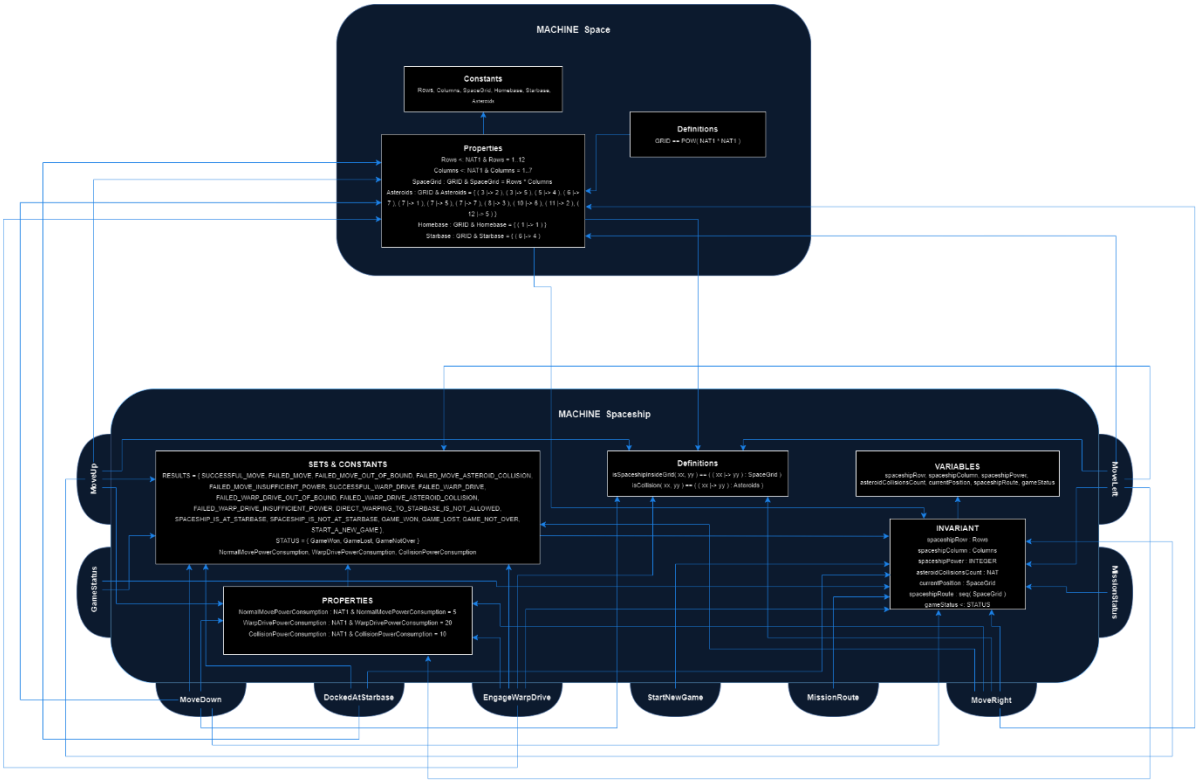
Structure Diagram



Description

The B-method program comprises two machines: MACHINE Space and MACHINE Spaceship. MACHINE Space is designed to represent the spatial environment or grid, denoted as SpaceGrid, within which various elements are defined. This grid is structured using constants, namely Rows and Columns, forming SpaceGrid. The SpaceGrid include Asteroids, serving as obstacles, and strategic points such as the starting point (Homebase) and the destination (Starbase). GRID ia defined as a set of sub-set of natural numbers. These numerical parameters play a crucial role in configuring SpaceGrid, Asteroids, Homebase, and Starbase, establishing the foundational framework for the spatial dynamics of the program. The complementary MACHINE Spaceship is presumably tasked with navigating through this spatial configuration defined by MACHINE Space, indicating a synergy between the two machines.

In MACHINE Spaceship, two essential sets, RESULTS and STATUS, play pivotal roles in tracking the outcomes of the spaceship's actions and the overall game status. RESULTS encompass the recorded results of moves and other pertinent actions, providing a comprehensive record of the spaceship's journey. Meanwhile, STATUS encapsulates crucial game states, including GameWon, GameLost, and GameNotOver, offering a dynamic assessment of the ongoing gameplay. To facilitate key evaluations, two Definitions are employed to verify whether the spaceship remains within the designated grid and if any collisions with asteroids have occurred. Three Constants, namely NormalMovePowerConsumption, WarpDrivePowerConsumption, and CollisionPowerConsumption, are established to quantify the power consumption associated with different types of moves. The program further defines a set of variables to monitor the spaceship's status: spaceshipRow and spaceshipColumn are derived from Rows and Columns in MACHINE Space, SpaceshipPower is an

Integer variable reflecting the current power level, AsteroidCollisionCount, a natural number variable, tracks the occurrences of collisions with asteroids, SpaceshipRoute is a sequence recording the executed moves, and gameStatus diligently monitors the overall game status, ensuring a comprehensive and dynamic assessment of the spaceship's journey through the designated space grid.

The program employs a set of operations to facilitate the movement of the spaceship in all four cardinal directions—up, down, left, and right—along with a specialized operation for executing the warp drive move. These operations play a crucial role in marking the spaceship's movements within the designated grid, allowing for dynamic navigation throughout the spatial environment. Additionally, another set of operations is implemented to retrieve the current status of both the spaceship and the overall game. These operations provide essential information such as the current game status and the recorded route of the spaceship, offering insights into the ongoing gameplay. Furthermore, a distinct operation is designed to initiate a new game, ensuring a seamless transition and reset of the game environment once the previous game concludes. This comprehensive set of operations enhances the functionality and interactivity of the B-method program, enabling users to control and monitor the spaceship's movements, retrieve critical status updates, and initiate new game sessions as needed.