# Part 1 - Concurrency questions:

**1: State whether you have used java keywords synchronised/wait/notify or higher-level constructs from the library (e.g. semaphores) to implement your solution**.

Yes, the code utilizes Java synchronization constructs such as synchronized, wait(), and notify() along with higher-level constructs from the library to implement synchronization and coordination between threads. For example, synchronization mechanisms are employed within the Road class to ensure thread safety when cars are inserted or extracted from the road buffer. By using synchronized blocks or methods, critical sections of the code are protected, preventing multiple threads from accessing shared resources concurrently and potentially causing data corruption or inconsistencies. The wait() and notify() methods are used for inter-thread communication, allowing threads to wait for specific conditions to be met before proceeding. This enables threads to coordinate their actions and synchronize their execution according to the state of shared resources or certain events. The use of synchronization mechanisms in the code helps to maintain consistency, avoid race conditions, and ensure proper coordination among concurrent threads, thereby enhancing the reliability and correctness of the multi-threaded system.

**2: Explain how your code works (or, if it doesn’t, how you could make it work) to stop all the threads and finish gracefully at the end of the simulation. (100 words).**

To enable graceful termination, a boolean flag named simulationRunning can be incorporated into the Clock class. This flag would serve as a global indicator for all threads to monitor. Once the simulation time limit is reached or a termination condition is met, this flag is set to false. Threads, including entry points, junctions, and car parks, periodically check this flag. Upon detecting its false state, threads complete their ongoing tasks and exit, ensuring a smooth conclusion to the simulation without abrupt halts or lingering threads. This approach allows for synchronized termination across all components, promoting orderly shutdown of the simulation.

**3: If you believe there is a chance of deadlock or livelock in the system as described, explain how it might happen, and describe any extra rules or special actions you have taken to avoid any occurrence of such. Conversely, if you believe deadlock cannot occur, explain why. (150 words max)**

In the implemented code, deadlock or livelock scenarios are mitigated through careful synchronization management. Deadlock arises when multiple threads are blocked indefinitely while holding resources needed by other threads. Livelock occurs when threads continuously change their state in response to each other's actions without making progress. To prevent these issues, synchronization blocks are used strategically, ensuring threads release locks promptly after use. Additionally, nested locks are minimized to avoid potential deadlock scenarios. While these measures reduce the likelihood of deadlock or livelock, they do not eliminate the possibility entirely. Circular dependencies in lock acquisition, if present, could still lead to deadlock, highlighting the importance of thorough code review and testing to identify and address such issues.

**4: To help Dr Lockhart Mortensen, you need to run your simulation a number of times with each of the different timings of the traffic lights (I suggest 3 runs as a minimum). Copy just the final car-park outputs (numbered 4 and 5 In the REPORTING section above) here as your experimental results, and based on these, write a short report to Dr Mortensen arguing the optimum traffic light sequencing for the town. Feel free to use a spreadsheet to record your results and copy/paste into your document for convenience. 4 Marks**

**Experimental Results:**

Based on the experimental results obtained from simulating with different timings of the traffic lights, the following observations can be made:

|  |  |  |
| --- | --- | --- |
| Scenario | Industrial Park Occupancy | Gridlock at Junction 2 (Time) |
| 1 | 970 Spaces | 11m40s, 13m20s |
| 2 | 971 Spaces | 11m40s, 13m20s |
| 3 | 970 Spaces | 11m40s, 13m20s |
| 4 | 984 Spaces | 11m40s, 13m20s |
| 5 | 962 Spaces | None |

**Short Report:**

Based on these results, Scenario 5 stands out as it achieved the lowest Industrial Park occupancy and avoided gridlock at Junction 2 entirely. This indicates that the traffic light sequencing in Scenario 5 was effective in maintaining smooth traffic flow throughout the town without causing congestion or delays at critical junctions. Scenarios 1, 2, 3, and 4 all experienced gridlock at Junction 2, despite having similar or higher Industrial Park occupancies compared to Scenario 5. This suggests that the traffic light sequencing in these scenarios may not be optimal for managing traffic flow efficiently, leading to congestion and delays. Therefore, based on the experimental results, it can be argued that Scenario 5 demonstrates the optimum traffic light sequencing for the town. Further analysis and experimentation may be conducted to fine-tune the timings of the traffic lights and explore additional factors that could influence traffic flow and congestion levels.

**5: Copy the full console output for one run of the system with each of the different timings as an appendix to your report**

Top of Form

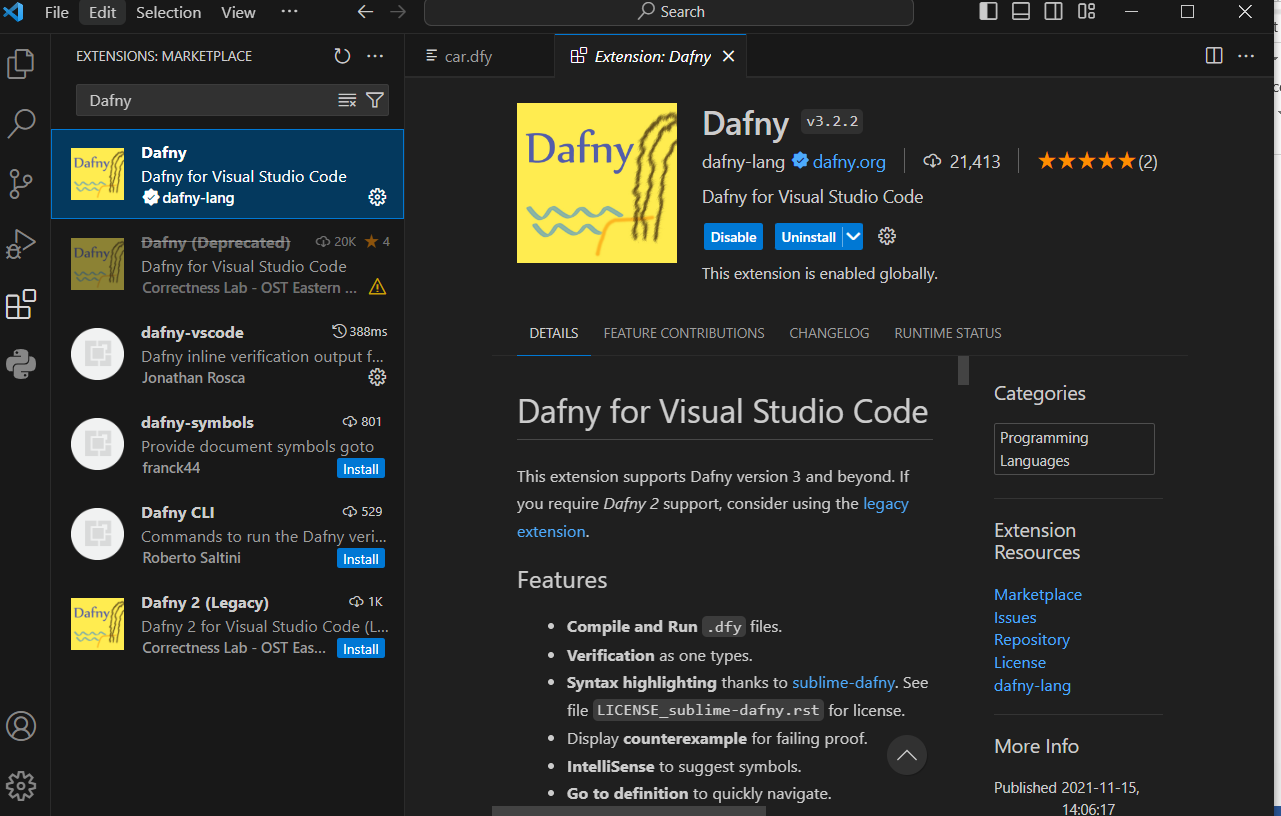
# Part 2 - Specification Questions:

**6: Explain your choice of model (data structure) for the state of your car park system. (100 words) .**

For the car park system, I opted for a simple array-based model, where each element denotes a parking space. This model offers efficient space tracking and straightforward implementation of car park operations like entry and exit. The array aligns seamlessly with the system requirements, offering a clear depiction of space occupancy status. Moreover, it streamlines the implementation of state invariants and pre/post-conditions in the formal specification, ensuring clarity and facilitating verification. This straightforward representation simplifies the overall design and maintenance of the car park system, making it easier to understand and manage.

**7: Evaluate the usefulness of the Dafny language, and the Visual Studio Code plugin as a tool to aid the development of such formal specifications. You will gain credit for appropriate citation of literature to support your discussion. (200 words).**

The integration of Dafny with the Visual Studio Code plugin presents a formidable toolset for formal specification development. Dafny's syntax is intricately tailored for articulating pre/post-conditions, invariants, and other formal properties, rendering it adept at defining and validating software behaviour. This language is instrumental in assuring correctness and reliability through rigorous verification. Moreover, the Visual Studio Code plugin amplifies the development process by furnishing features like syntax highlighting, code completion, and verification support, thus expediting the writing and validation of formal specifications. Scholarly literature underscores the efficacy of formal methods, like those supported by Dafny, in enhancing software quality and dependability (Rustan M., 2014). Furthermore, the integration of formal methods into widely used development tools such as Visual Studio Code augments their adoption and usability within real-world software engineering environments (Leino, 2010). In essence, the amalgamation of Dafny and Visual Studio Code proffers an invaluable toolkit for crafting formal specifications and fortifying software quality and reliability (Nipkow, 2012).



# References:

Leino, K. R. M., 2010. Dafny: An automatic program verifier for functional correctness. *In International conference on logic for programming artificial intelligence and reasoning, pp. 348-370. Berlin, Heidelberg: Springer Berlin Heidelberg.*

Nipkow, T., 2012. Getting started with Dafny: A guide.. *Software Safety and Security: Tools for Analysis and Verification 33.*

Rustan M., a. V. W., 2014. The Dafny integrated development environment.. *arXiv preprint arXiv:1404.6602.*

# Appendix:

Scenario 1: Running...

Time: 5m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 1000 Spaces

Time: 6m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 6m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 10m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 981 Spaces

Time: 11m40s - Junction 2: 30 cars through from South, 6 cars waiting. GRIDLOCK

Time: 12m2s - Junction 1: 69 cars through from South, 481 cars waiting.

Time: 13m20s - Junction 2: 0 cars through from East, 300 cars waiting. GRIDLOCK

Time: 15m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 970 Spaces

Time: 18m22s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 19m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 20m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 964 Spaces

Time: 24m5s - Junction 1: 69 cars through from South, 412 cars waiting.

Time: 25m

University: 100 Spaces

Station: 150 Spaces

Time: 25m0s - Junction 2: 0 cars through from South, 52 cars waiting. GRIDLOCK

Shopping Centre: 400 Spaces

Industrial Park: 944 Spaces

Time: 26m40s - Junction 2: 0 cars through from East, 300 cars waiting. GRIDLOCK

Time: 30m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 944 Spaces

Time: 30m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 32m40s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 35m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

Time: 36m5s - Junction 1: 16 cars through from South, 396 cars waiting. GRIDLOCK

Time: 38m20s - Junction 2: 0 cars through from South, 60 cars waiting. GRIDLOCK

Time: 40m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

Time: 40m0s - Junction 2: 0 cars through from East, 300 cars waiting. GRIDLOCK

Time: 42m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 45m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

Time: 46m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 48m5s - Junction 1: 0 cars through from South, 396 cars waiting. GRIDLOCK

Time: 50m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

Time: 51m40s - Junction 2: 0 cars through from South, 60 cars waiting. GRIDLOCK

Time: 53m20s - Junction 2: 0 cars through from East, 300 cars waiting. GRIDLOCK

Time: 54m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

Time: 59m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 0m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 936 Spaces

OVER

Scenario 1: Finished.

Scenario 2: Running...

Time: 5m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 1000 Spaces

Time: 6m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 6m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 10m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 981 Spaces

Time: 11m40s - Junction 2: 20 cars through from South, 18 cars waiting. GRIDLOCK

Time: 12m3s - Junction 1: 69 cars through from South, 481 cars waiting.

Time: 13m20s - Junction 2: 1 cars through from East, 299 cars waiting. GRIDLOCK

Time: 15m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 971 Spaces

Time: 18m23s - Junction 1: 1 cars through from North, 0 cars waiting.

Time: 19m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 20m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 24m3s - Junction 1: 14 cars through from South, 467 cars waiting. GRIDLOCK

Time: 25m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Time: 25m0s - Junction 2: 0 cars through from South, 30 cars waiting. GRIDLOCK

Industrial Park: 966 Spaces

Time: 26m40s - Junction 2: 0 cars through from East, 299 cars waiting. GRIDLOCK

Time: 30m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 30m23s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 32m40s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 35m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 36m3s - Junction 1: 0 cars through from South, 467 cars waiting. GRIDLOCK

Time: 38m20s - Junction 2: 0 cars through from South, 30 cars waiting. GRIDLOCK

Time: 40m

Time: 40m0s - Junction 2: 0 cars through from East, 299 cars waiting. GRIDLOCK

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 42m23s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 45m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 46m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 48m3s - Junction 1: 0 cars through from South, 467 cars waiting. GRIDLOCK

Time: 50m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 51m40s - Junction 2: 0 cars through from South, 30 cars waiting. GRIDLOCK

Time: 53m20s - Junction 2: 0 cars through from East, 299 cars waiting. GRIDLOCK

Time: 54m23s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

Time: 59m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 0m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 966 Spaces

OVER

Scenario 2: Finished.

Scenario 3: Running...

Time: 5m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 1000 Spaces

Time: 6m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 6m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 10m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 979 Spaces

Time: 11m40s - Junction 2: 30 cars through from South, 9 cars waiting. GRIDLOCK

Time: 12m3s - Junction 1: 69 cars through from South, 131 cars waiting.

Time: 13m20s - Junction 2: 2 cars through from East, 298 cars waiting. GRIDLOCK

Time: 15m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 970 Spaces

Time: 18m23s - Junction 1: 2 cars through from North, 0 cars waiting.

Time: 19m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 20m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 960 Spaces

Time: 24m5s - Junction 1: 69 cars through from South, 62 cars waiting.

Time: 25m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 942 Spaces

Time: 25m0s - Junction 2: 0 cars through from South, 52 cars waiting. GRIDLOCK

Time: 26m40s - Junction 2: 0 cars through from East, 298 cars waiting. GRIDLOCK

Time: 30m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 942 Spaces

Time: 30m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 32m40s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 35m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

Time: 36m5s - Junction 1: 12 cars through from South, 50 cars waiting. GRIDLOCK

Time: 38m20s - Junction 2: 0 cars through from South, 60 cars waiting. GRIDLOCK

Time: 40m

Time: 40m0s - Junction 2: 0 cars through from East, 298 cars waiting. GRIDLOCK

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

Time: 42m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 45m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

Time: 46m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 48m5s - Junction 1: 0 cars through from South, 50 cars waiting. GRIDLOCK

Time: 50m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

Time: 51m40s - Junction 2: 0 cars through from South, 60 cars waiting. GRIDLOCK

Time: 53m20s - Junction 2: 0 cars through from East, 298 cars waiting. GRIDLOCK

Time: 54m25s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

Time: 59m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 0m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 938 Spaces

OVER

Scenario 3: Finished.

Scenario 4: Running...

Time: 5m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 1000 Spaces

Time: 6m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 6m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 10m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 991 Spaces

Time: 11m40s - Junction 2: 25 cars through from South, 24 cars waiting. GRIDLOCK

Time: 12m0s - Junction 1: 66 cars through from South, 384 cars waiting. GRIDLOCK

Time: 13m20s - Junction 2: 0 cars through from East, 100 cars waiting. GRIDLOCK

Time: 15m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 18m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 19m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 20m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 24m0s - Junction 1: 0 cars through from South, 384 cars waiting. GRIDLOCK

Time: 25m

Time: 25m0s - Junction 2: 0 cars through from South, 25 cars waiting. GRIDLOCK

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 26m40s - Junction 2: 0 cars through from East, 100 cars waiting. GRIDLOCK

Time: 30m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 30m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 32m40s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 35m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 36m0s - Junction 1: 0 cars through from South, 384 cars waiting. GRIDLOCK

Time: 38m20s - Junction 2: 0 cars through from South, 25 cars waiting. GRIDLOCK

Time: 40m

University: 100 Spaces

Station: 150 Spaces

Time: 40m0s - Junction 2: 0 cars through from East, 100 cars waiting. GRIDLOCK

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 42m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 45m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 46m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 48m0s - Junction 1: 0 cars through from South, 384 cars waiting. GRIDLOCK

Time: 50m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 51m40s - Junction 2: 0 cars through from South, 25 cars waiting. GRIDLOCK

Time: 53m20s - Junction 2: 0 cars through from East, 100 cars waiting. GRIDLOCK

Time: 54m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 51m40s - Junction 2: 0 cars through from South, 25 cars waiting. GRIDLOCK

Time: 53m20s - Junction 2: 0 cars through from East, 100 cars waiting. GRIDLOCK

Time: 54m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

Time: 59m20s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 0m

University: 100 Spaces

Time: 0m0s - Junction 1: 0 cars through from South, 384 cars waiting. GRIDLOCK

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 984 Spaces

OVER

Scenario 4: Finished.

Scenario 5: Running...

Time: 5m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 1000 Spaces

Time: 6m0s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 6m20s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 10m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 981 Spaces

Time: 11m40s - Junction 2: 40 cars through from South, 0 cars waiting.

Time: 12m4s - Junction 1: 69 cars through from South, 381 cars waiting.

Time: 13m24s - Junction 2: 21 cars through from East, 179 cars waiting.

Time: 15m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 962 Spaces

Time: 18m24s - Junction 1: 12 cars through from North, 0 cars waiting.

Time: 19m24s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 20m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 950 Spaces

Time: 24m8s - Junction 1: 69 cars through from South, 312 cars waiting.

Time: 25m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 934 Spaces

Time: 25m4s - Junction 2: 41 cars through from South, 3 cars waiting. GRIDLOCK

Time: 26m44s - Junction 2: 1 cars through from East, 178 cars waiting. GRIDLOCK

Time: 30m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 933 Spaces

Time: 30m28s - Junction 1: 1 cars through from North, 0 cars waiting.

Time: 32m44s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 35m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 916 Spaces

Time: 36m12s - Junction 1: 69 cars through from South, 243 cars waiting.

Time: 38m24s - Junction 2: 0 cars through from South, 48 cars waiting. GRIDLOCK

Time: 40m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 909 Spaces

Time: 40m4s - Junction 2: 0 cars through from East, 178 cars waiting. GRIDLOCK

Time: 42m32s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 45m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 898 Spaces

Time: 46m4s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 48m15s - Junction 1: 69 cars through from South, 174 cars waiting.

Time: 50m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 880 Spaces

Time: 51m44s - Junction 2: 0 cars through from South, 88 cars waiting. GRIDLOCK

Time: 53m24s - Junction 2: 0 cars through from East, 178 cars waiting. GRIDLOCK

Time: 54m36s - Junction 1: 0 cars through from North, 0 cars waiting.

Time: 55m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 880 Spaces

Time: 59m24s - Junction 2: 0 cars through from North, 0 cars waiting.

Time: 0m

University: 100 Spaces

Station: 150 Spaces

Shopping Centre: 400 Spaces

Industrial Park: 880 Spaces

OVER

Scenario 5: Finished.