# Phase 1 - September: Advantages of parallel compared with serial computation, for route-planning problems and how increased data size may affect this.

September 28, 2021

**Phase 1 Project Selection Status Report**

Name: Marcus Alexander Karmi September

College: Clare

CRSID: maks2

Director of Studies: Lawrence Paulson

**Please complete 1, 2 and 3 below.**

1. *Please write 100 words on your current project ideas.*

   It's possible to solve APSP through repeated squaring of the adjacency matrix. Since parallelising matrix multiplication is a well-explored area, APSP may be solved more efficiently on a multi-core system by using efficient parallel matrix multiplication techniques, compared to serial alternatives.

   I'll implement such a parallel algorithm in Java, using efficient matrix multiplication techniques that minimise data movement, as well as other optimizations. With Java's Thread API, I can simulate a processor with an arbitrary amount of cores, interconnected through arbitrary network topologies. I'll evaluate the advantage of my parallel implementation, and then see how this advantage and the design of the algorithm change as the data size increases relative to the number of processing elements available.

2. *Please list names of potential project supervisors, indicating any interactions you have had with them, for example: not contacted, awaiting reply,*

*in discussion, agreed to supervise.*

Dr Jagdish J. Modi (jm505):

- Agreed to supervise
- I have been in contact with Dr J. Modi through several email exchanges and we have had two Zoom calls.

3. *Is there any chance that your project will involve any computing resources other than the Computing Service's MCS and software that is already installed there, for example: your own machine, machines in College, special peripherals, imported software packages, special hardware, network access, substantial extra disc space on the MCS. If so indicate below what, and what it is needed for.*

   - My personal laptop, needed for running my Java programs
   - Real-world graph datasets, needed for evaluating my algorithm