

Pre-Silicon Testing at the Speed of Light

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Pre-silicon testing

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- Stick your GPU on an FPGA?
 - Takes absolutely ages to upload the bit stream
 - How big is your FPGA anyway?
 - Usable execution times but overhead is pain

Pre-silicon testing

- Compile your bitstream to C?
 - When you think about it, isn't a CPU just a weird FPGA?
 - HDL simulators can run your VHDL/Verilog/etc on your computer, or SystemC lets you just write an ASIC in C++ to begin with (??)
 - Obviously, not fast like the speed of light

Arm Fixed Virtual Platforms

- Arm make FVPs available to roll all their IP up into one
- Single binary emulating an EC, CPU, UART, interconnect cluster, display controller, and ... GPU!
- Free to download (search 'arm compute subsystem fvp'), generally released on an annual cadence
- Lets us work on hardware without waiting for the IP release
→ SiP design → tape-out → wafer → ODM → board → verification → fix → board → zzzzz → eventually us?? pipeline

Working with FVPs

- Build the firmware (RSE, MCU, TF-A, FF-A, OP-TEE, u-boot)
- Make the firmware binaries available through virtio-blk
- Boot a regular Arm boot chain into userspace (2-3min)
- UART console lets you log in (fast)
- Copy your new Mesa build over and run CTS (forever)
- Realise you made a mistake (immediate)
- Weeping, gnashing of teeth

Wrap it up in CI

- So it just looks like a hardware device, albeit weird & slow
- Automate the process, aim for fire & forget
- Custom gitlab-runner harness lets us drive the FVP much more directly than any of the existing systems
- Treats the FVPs as a similar target to Docker
- Mesa MR posted but needs some* work



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The speed of light

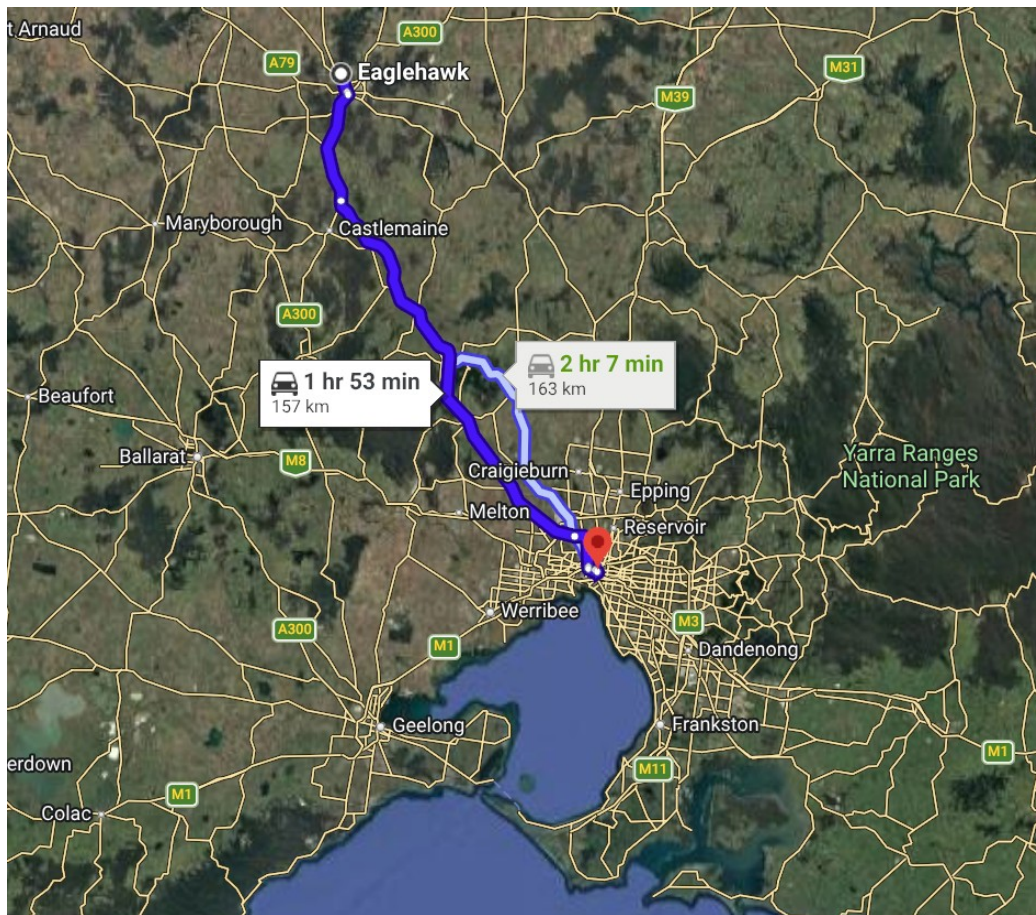
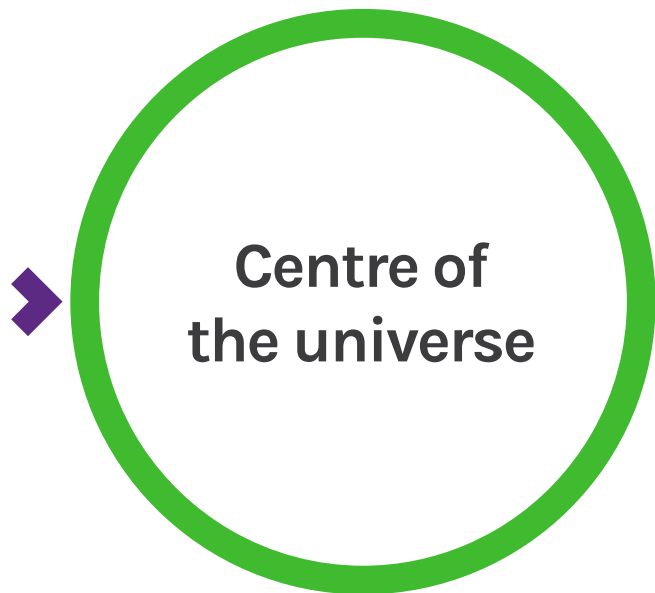
Vroom vroom

- Light moves at 299,792,458 m/s
- This is generally considered to be quite fast



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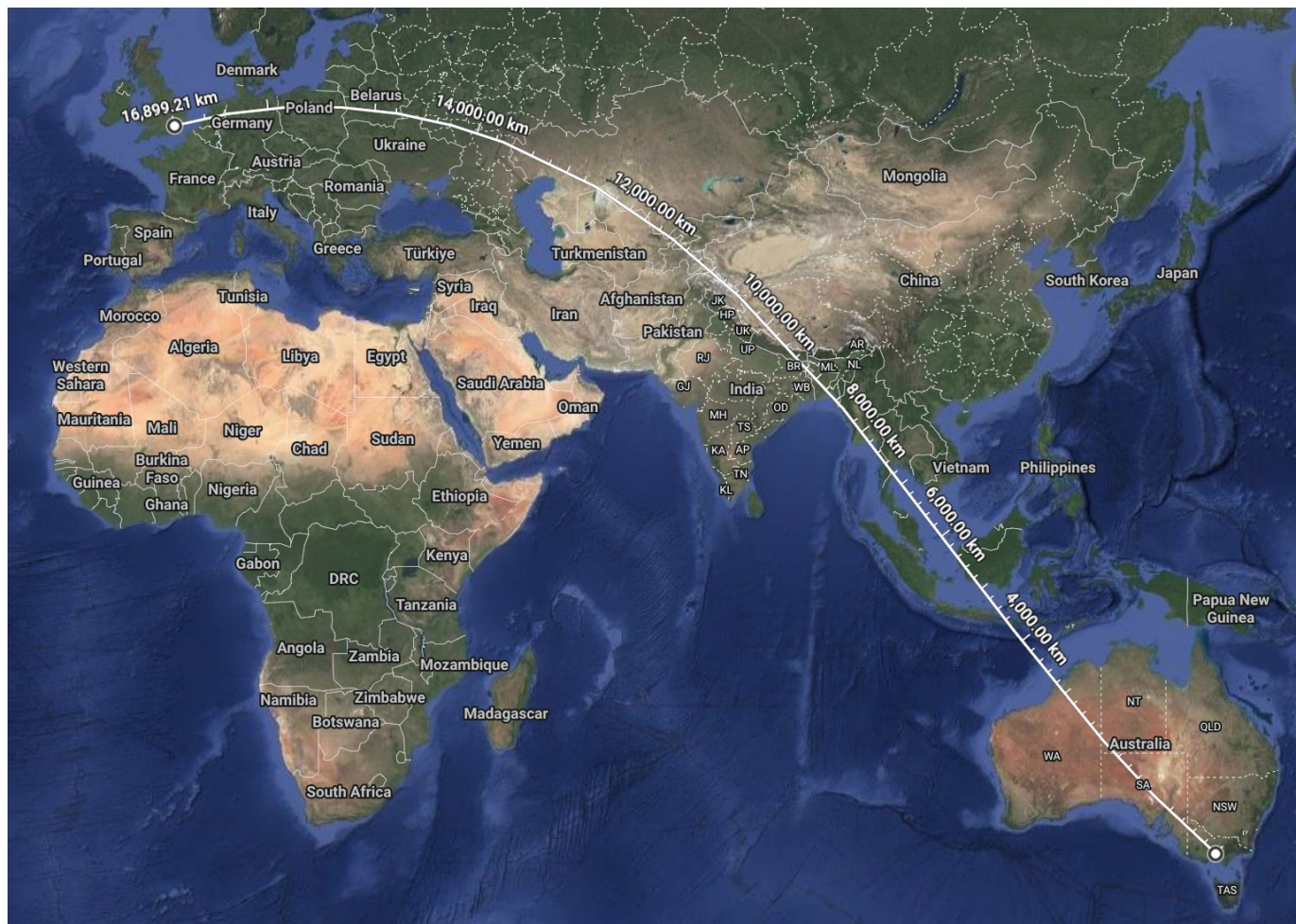
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A small
body of
water



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Vroom vroom??

- Light moves at 299,792,458 m/s
- This is generally considered to be quite fast
- Moving through fibre slows it down (-33% approx)
- The quickest a packet can ever make it from Melbourne to London and back is approx 165ms
- Switching is not infinitely fast
- Even in 2026, it's generally around 250ms





Thank you!



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