Project Omega

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An Electronics Prototyping and Development Platform
"The Poor Man's PXI Rack'n'Stack"

So what's the plan?

- Fully open-source hard/software

- Community driven / crowd sourced effort

- Simple backplane with modular electronic cards

- Cards have specialty function with common core

- Hardware Configured-on-the-fly

- System-level "apps" that are part embedded code, part FPGA RTL and part host/User Interface code

- Ability to become any instrument, programmer, controller, interface as desired, <u>just with a change of app</u>.
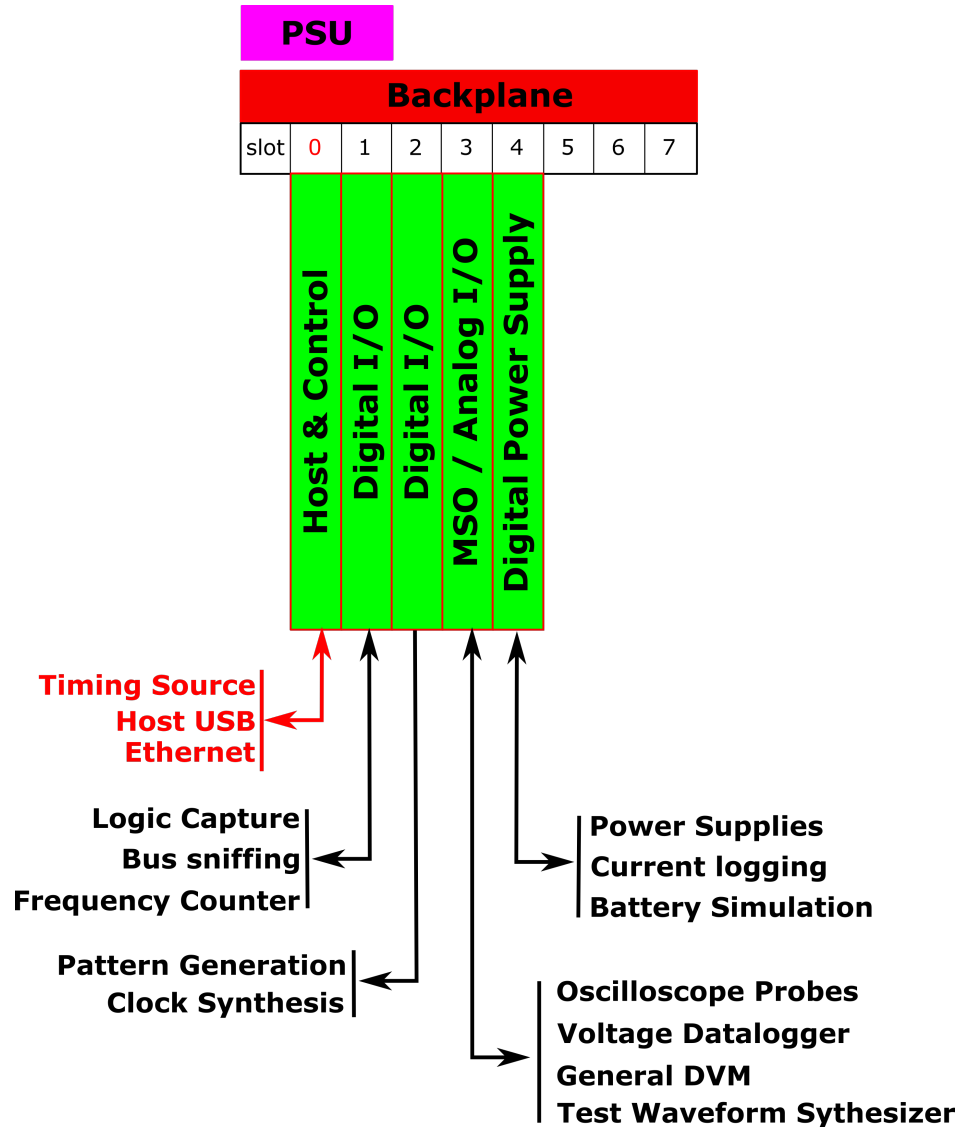
- **Hackable in "real time"**

Why bother?

- My desk is covered in various adapters, boxes and instruments with disparate tool-chains

- Lots of wasted commonality between functions e.g. power supplies, host interfaces, displays etc.

- Closed source hardware and software: small chance of customisation

- Mini ATE-in-a-box would be **<u>so</u>** useful

- Similar systems exist using VME, PXI, LXI etc. from companies like National Instruments – v. expensive

- **Because I can. (With some help)**

Applications: Example Killer App

- **Hardware Configurable Logic Analyser**: triggers, protocol decoders, capture qualifiers, formatting, etc. All determined at *compile time not runtime*

- **Configurable in the bitstream** to optimise FPGA usage → No need to waste macrocells on unused functions

- App is **extensible** with hardware modules created by the community and held in a public repository

- Leverage **MyHDL** to modularise RTL using python

- Incremental compilation of RTL to speed up configuration

Example Rack Configuration

PSU

Backplane

slot	0	1	2	3	4	5	6	7

Host & Control
Digital I/O
Digital I/O
MSO / Analog I/O
Digital Power Supply

Timing Source
Host USB
Ethernet

Logic Capture
Bus sniffing
Frequency Counter

Pattern Generation
Clock Synthesis

Power Supplies
Current logging
Battery Simulation

Oscilloscope Probes
Voltage Datalogger
General DVM
Test Waveform Sythesizer

Expected Functionality

- Mechanically fits a 3U 19" rack form factor

- DIN Eurocard Modules using DIN41612 connectors

- **Module "Core" based on STM32F7xx + Lattice iCE40HX + SDRAM + Good quality PLL.**

- Digital Card: SE, Diff, prog levels, multi-voltage, PPMU, protected. Optimised for Logic Analysis, Pattern generation, GPIO. High speed clock IO.

- Analog Card: 4ch 300-400Msps, Analog front-end MSO, AWG, Analog "GPIO." Audio IO, DVM.

- DPS Card: 4ch 4-quadrant PSU, Programmable BW, Modulation, Current measurement.

Architecture
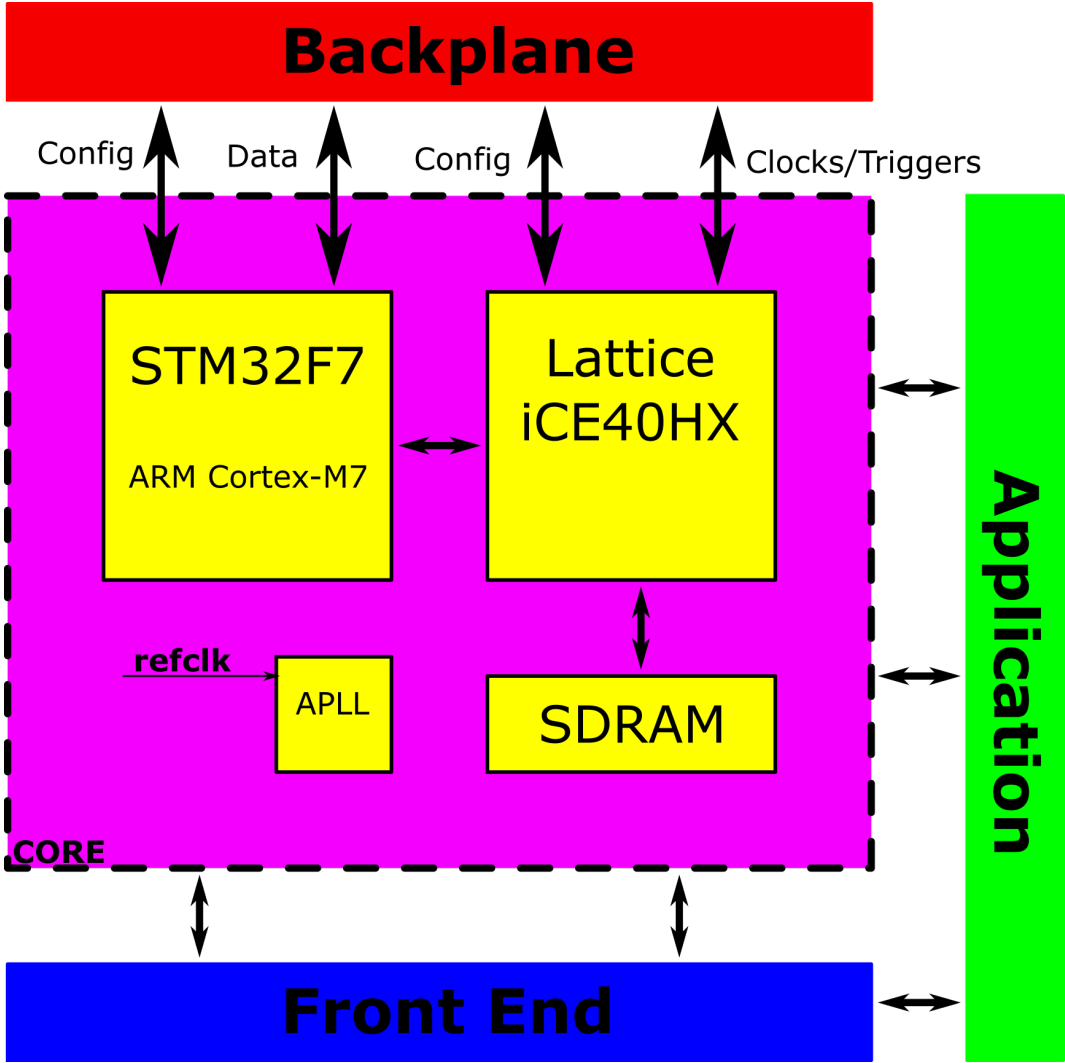
Get in touch

- **Forum and blog with (very) preliminary specs**

- **www.omega-project.org.uk**

  Thank you!