Alex Cole.
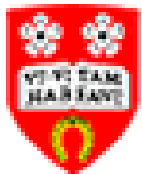
Hardware/Software Co-Design Language Development,
An EngD Introduction

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Main Research

- Hardware/software co-design language development

- Formal methods and verification

- Bespoke HW/SW

- Target abstraction

- Communications

Project Areas

▶ Using Esterel in HW and SW simultaneously

▶ FPGAs and GPUs – Data-parallel and code-parallel hardware in computers

▶ Software and hardware tradeoffs for maximum energy efficiency

Project Areas

```
a = a ^ b;
b = b ^ a;
a = a ^ b;



c = a;
a = b;
b = c;



SWAP(a, b);
```

- ▸ Number of reads

- ▸ Number of writes

- ▸ Number of operations

- ▸ Number of registers

- ▸ Speed, Space, Power

Project Areas
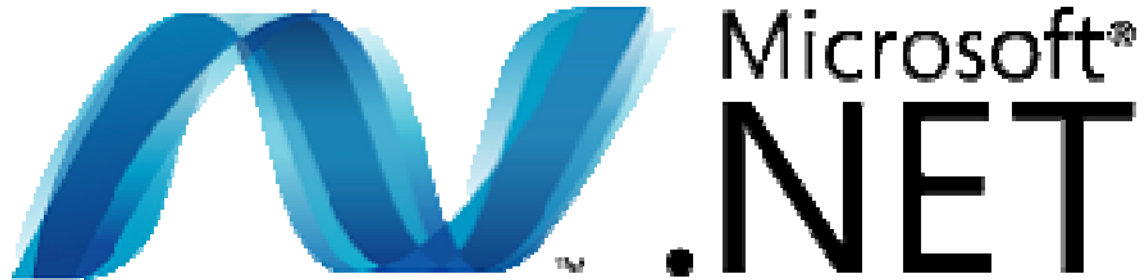
▶ Using Esterel in HW and SW simultaneously

▶ FPGAs and GPUs – Data-parallel and code-parallel hardware in computers

▶ Software and hardware tradeoffs for maximum energy efficiency

▶ .NET native processor

▶

.NET Native Processor

- Execute CIL on a custom FPGA soft core

- Code portability

- Abstract stack

- Tiny subset of .NET features

.NET Native Processor

▶ Parallel garbage collection and memory management

▶ Multiple cores for processes

▶ Hardware process communication

▶ CSP style interface

▶

Thank You