

Lecture 1: What is Hacking?

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What is Hacking?



(re-)Use of Unintended Functions

- Unintended Function Discovery
- Creative Re-purpose & Composition

Unintended Function Discovery



Creative Re-purpose & Composition



The "never give up" example



Other hardware examples

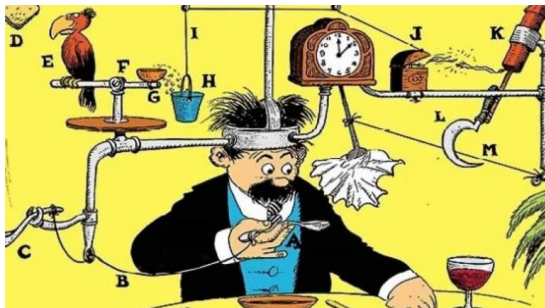


Simple Display Emulator with an HDMI-VGA Adapter

Consider the hacker from your current perspective

They're just people who know computers very well

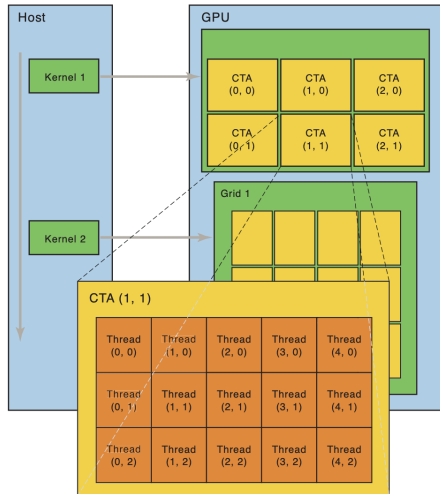
They compose unintended components in order to achieve unexpected artifacts.



Professor Butts and the Self-Operating Napkin

Single Instruction, Multiple Threads

- Many threads execute the same instruction
- Each thread has some thread-local data (e.g., ID)
- Highly optimized design
 - One Program Counter (PC), multiple data elements
 - Successor to VLIW and SIMD architectures



GPU Driver Overview

Reference: [Parallel Thread Execution ISA Application Guide](#)

GPU Drivers are Complex Essential Tools in the CUDA Toolchain

- **gcc** → **nvcc**: NVIDIA CUDA Compiler, used to compile CUDA code.
- **binutils** → **cuobjdump**: Disassembler for CUDA binaries.
- **gdb** → **cuda-gdb**: Debugger for CUDA code.
 - Allows debugging directly on the GPU!
- **perf** → **nvprof**: Performance profiling tool to analyze GPU code.
- ...

CUDA brings a complete set of tools to the GPU, similar to what we have for CPUs.

Note: NVIDIA open-sourced its [driver](#) in 2022!

- Before that ... [Video](#)

How to become a hacker?

(Why hacking is Computer Science?)

Exploit code is a “program”

that is composed by unintended computation abilities, achieving an unintended goal on the original platform.

Writing Exploits = Programming of Unintended Automata

- Get to know the computers really well - dive into the OS and architecture.
- Keep Coding, coding and coding!