



# Raspberry Pi Pico 2 Part 1: Overview

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# Pico 2 Part 1: Outline

- ◆ Quick history of Raspberry Pi
- ◆ The Picos are chips, not boards
- ◆ Pico 2 details
- ◆ Pico vs Pico 2
- ◆ Pico Tools
- ◆ Short demos
- ◆ References
- ◆ These slides available at the URL below  
(scroll down to Apr 13, 2026)  
<https://triembed.org/triembed-presentation-archive/>

# Raspberry Pi Foundation goal #1:





# Product history

- ◆ Original Raspberry Pi SBC Spring 2011
  - ◆ Silly low price: acceptance explosive
  - ◆ Five generations of main model
  - ◆ Compute modules, Pi inside keyboard
- ◆ First Pico RP2040 introduced in 2021
  - ◆ Even sillier low price
  - ◆ SDK, tool chains ready
  - ◆ DOCUMENTATION ready
  - ◆ As of now Digikey has 47000 to ship
- ◆ Pico 2 RP2350/4 2024
  - ◆ Way better for about a 10 cents more

# Raspberry Pi Pico 2 breakout

- ◆ Includes 4MB flash
- ◆ JTAG support
- ◆ MANY other boards
  - ◆ Some with radios





# Pico 2 high order bits (key details)

- ◆ Two cores at default 150MHz:
  - ◆ overclocking tolerated well
  - ◆ ARM M33 or RISC-V chosen at startup
- ◆ 520KB SRAM in 10 separate banks
- ◆ Sophisticated bus fabric
  - ◆ Concurrency not just via dual cores: + DMA + three PIO == 6 streams that can be at least partially concurrent!
- ◆ 4 ADC channels on A parts, 8 on B
- ◆ PIO offers high speed, smart I/O



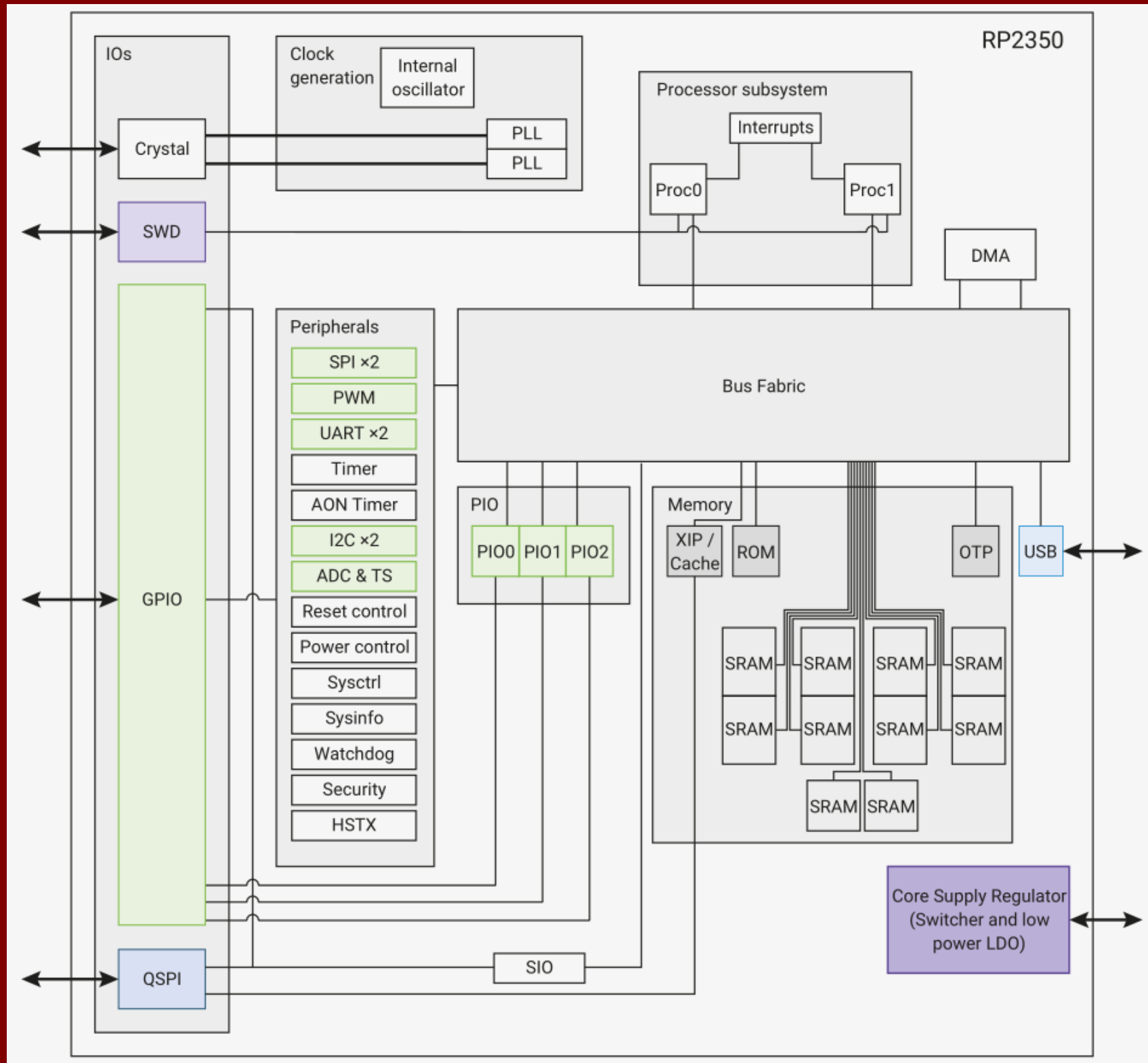
## Details Cont'd

- ◆ HSTX offers high speed serial output for video devices
- ◆ Excellent software support of advanced features: accessible documentation
- ◆ Flash outboard on RP2350, 2MB internal on RP2354, PSRAM supported: up to 16MB each outboard with 16KB cache
- ◆ 30 GPIO pins on RP2350/4A , 48 on RP2350/4B (60 and 80 pins total)
- ◆ Summary: To the best of my knowledge there is no other MPU that touches Pico 2 for concurrency even at 10X price



# Unpretty details

- ◆ No built in radio
  - ◆ Pico 2 W breakout has Infineon wifi + bluetooth radio
- ◆ Core switching supply PCB layout is unforgiving
  - ◆ Must carefully follow guidelines
  - ◆ Use the specific Abracon inductor called out
- ◆ No leads package is hard to hand solder
  - ◆ Hot air not optional
- ◆ Silkscreen on \*bottom\* of breakout!?!





# Peripheral Support

- ◆ 2 × UARTs
- ◆ 2 × SPI controllers
- ◆ 2 × I2C controllers
- ◆ 24 × PWM channels
- ◆ USB 1.1 controller and PHY, with host and device support
- ◆ 12 × PIO state machines in blocks of four
- ◆ PIO can emulate common protocols like I2S and custom ones such as Z80
- ◆ 1 × HSTX for serial output like DVI, HDMI



# RP2350 vs RP2340

- ◆ About double the RAM with more banks, outboard PSRAM support with 2<sup>nd</sup> chip select
- ◆ More programmable I/O (PIO) blocks
- ◆ High speed serial output (HSTX) support
- ◆ Always on 64 bit timer with more flexible RTC support
- ◆ Security support with one time programmable flash and SHA 256 acceleration



# Pico Tools

- ◆ Raspberry Pi Pico SDK
  - ◆ Pretty easy to use
  - ◆ Comprehensive APIs
  - ◆ Easy to use threads
  - ◆ Easy to steer threads to cores
  - ◆ Command line tools for Linux
    - ◆ I know \*nothing\* about command line support outside of Linux
- ◆ JTAG debugging fully supported
  - ◆ But not many hardware breakpoints
- ◆ Micropython port



# GUI IDE Support

- ◆ VS Code support via Pico plugin
  - ◆ Note VS Code combines MIT licensed source with Microsoft telemetry and other “improvements”.
  - ◆ VSCodium binaries are contain only the MIT code. See the references page for a URL.
- ◆ Arduino 1.8.9 and 2.3.x support Pico
  - ◆ Note 2.3 out of the box won't run on Linux. See references for workaround



# References (see note next slide)

- ◆ Raspberry Pi org site
- ◆ Raspberry Pi com site
- ◆ Getting Started With Raspberry Pi Pico Series
- ◆ Raspberry Pi Pico 2 RP2350 Datasheet
- ◆ Pico 2 W Breakout Datasheet
- ◆ Pico 2 Breakout Datasheet
- ◆ Pico SDK
- ◆ VSCodium - VS Code sans Microsoft goop
- ◆ Arduino IDE (2.3.x and legacy 1.8.x)
- ◆ Pico Micropython



# Trouble with references hyperlinks?

For example Linux evince fails to follow a hyperlink. Best to view the PDF within a web browser (i.e. following from the link in the outline slide)