Embedded Security for Devices

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Talk Outline

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   - What's Different?
   - Cipher Suites, Environments, TLS 1.2
   - Secure Memcache
   - Secure Firmware Updates

2. **yaSSL Embedded Web Server**

3. **Fun yaSSL projects**
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   - CyaSSL in Use
   - Porting CyaSSL to Android
   - CyaSSL support for OpenWrt

yaSSL

CyaSSL Embedded SSL Library

Basic Information

- Project Genesis
- C-language based SSL Library
- Targeted at embedded and RTOS environments
- Focused on size and speed optimization
- Supports all industry standards
- Highly Portable
- Dual Licensed (GPLv2 and Commercial)
- Single source base, same dev team since 2004
- Where do we fit in the SSL ecosystem?

Up to <u>20 times</u> smaller than OpenSSL

yaSSL

CyaSSL Embedded SSL Library

What's different about CyaSSL?

- Standards up to TLS 1.2, DTLS
- Minimum size of 30-100 kB
- Runtime Memory 5-50 kB
- Simple API
- OpenSSL Compatibility Layer

- Hardware optimization, including AES-NI, various assembly packs.

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CyaSSL Embedded SSL Library

Cipher suites

MD2, MD4, MD5, SHA-1, SHA-512, RIPEMD -------

DES, 3DES, AES, ARC4, RABBIT, HC-128 ---------

RSA, DSS, DH NTRU ----------

HMAC, PBKDF2 ----------

Hashing Functions
Block and Stream Ciphers
Public Key Options
Password-based Key Derivation

Or add your own!

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CyaSSL Embedded SSL Library

Supported Environments:

- Works **without** an OS
- Works **with** an OS

- Portability is a priority for us

Win32/64, Linux, Mac OS X, Solaris, ThreadX, VxWorks,
FreeBSD, NetBSD, OpenBSD, OpenWRT, iPhone (iOS),
Nintendo Wii and Gamecube through DevKitPro, QNX, MontaVista, OpenCL,
NonStop, Tron/itron/microitron

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CyaSSL Embedded SSL Library

TLS 1.2 Support

- Enhanced Security
- Less susceptible to MITM attacks
- One of the first SSL libraries to support TLS 1.2
  - CyaSSL, GnuTLS

- Other TLS 1.2 firsts:
  - Browser: Opera

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Secure Memcache

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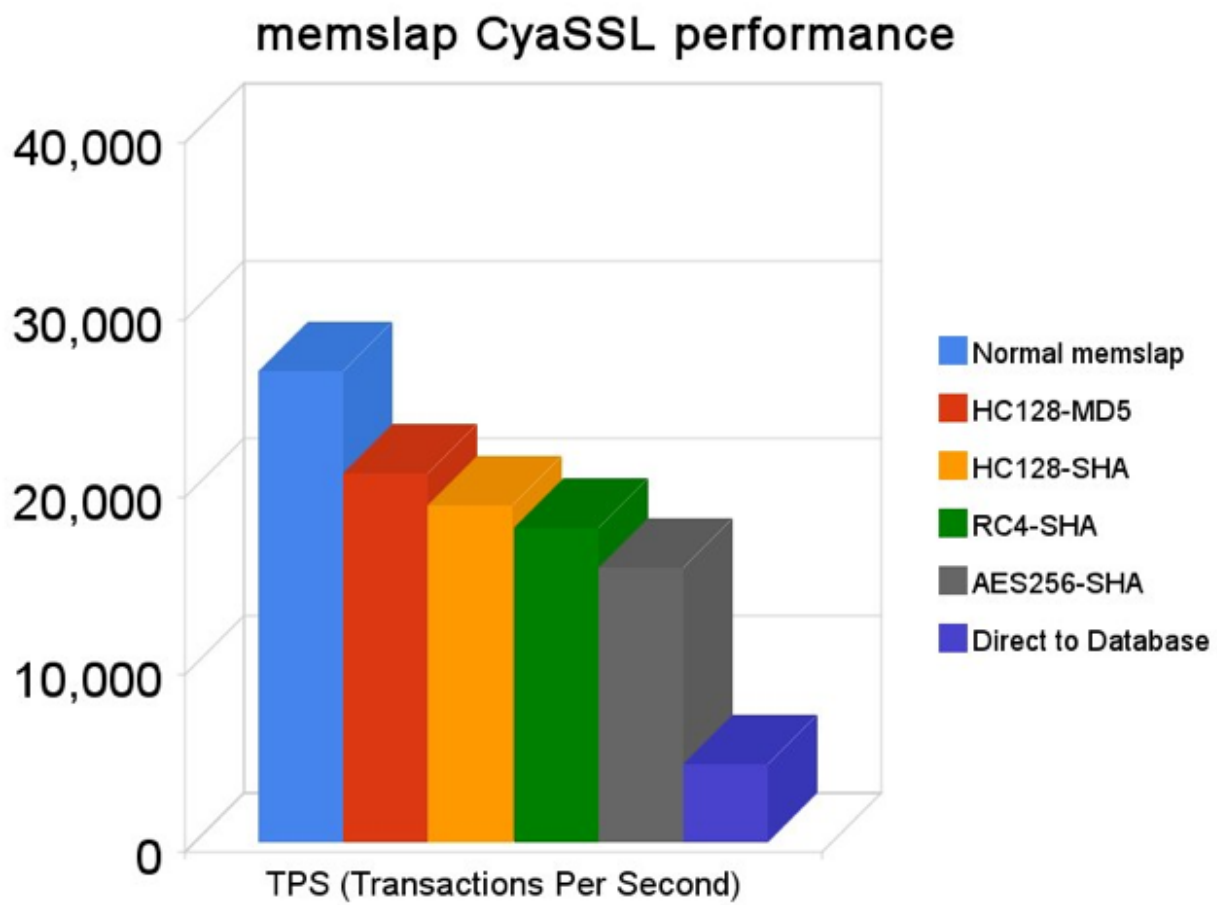
CyaSSL Embedded SSL Library

Secure Memcache - Performance



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CyaSSL Embedded SSL Library

Upcoming Project: Secure Firmware Updates

- Digitally signing firmware is a top priority today
- Protect against unauthorized updates
- Enable files to be securely loaded onto your device
- Ensure against malicious files

Code sign your updates!

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CyaSSL Embedded SSL Library

- RSA Key Generation
- x509v3 Signed Certificate Generation

Make your own keys and be your own certificate authority...for all the right reasons.

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yaSSL Embedded Web Server

What is it?

- Based on the Mongoose Embedded Web Server
- Uses CyaSSL for SSL functionality built-in!
- Small size
- Based on customer needs

yaSSL Embedded Web Server

Features

- HTTPS Support via CyaSSL
- Default size, with SSL enabled of less than 100 kB; 40kB without
- CGI, SSL, SSI, Resumed Downloads, Aliases and more!
- IP-based Access Control Lists
- GET, POST, HEAD, PUT, DELETE methods

Perfect for Embedded Environments

yaSSL

yaSSL Embedded Web Server

Supported Environments

ThreadX, VxWorks, QNX, OpenWRT, Tron, iTron, Microitron, OpenCL, MontaVista, Mac OS, Linux

License

GPL and Commercial

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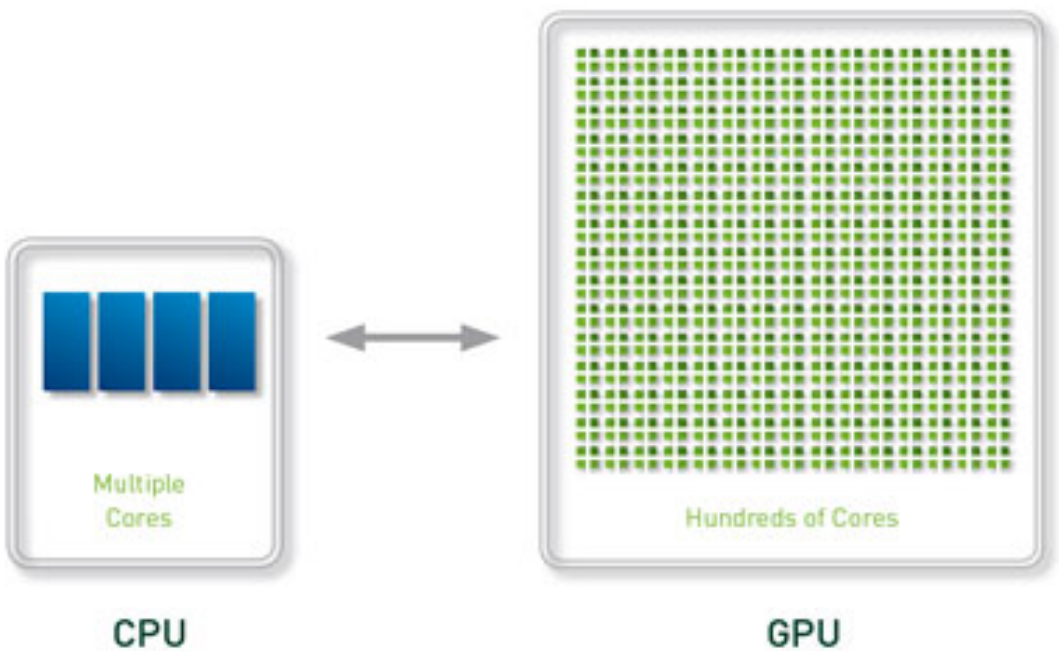
CyaSSL on a GPU!

- Run your SSL on a GPU for performance gains
- Porting to OpenCL
- Harness latent GPU power for crypto



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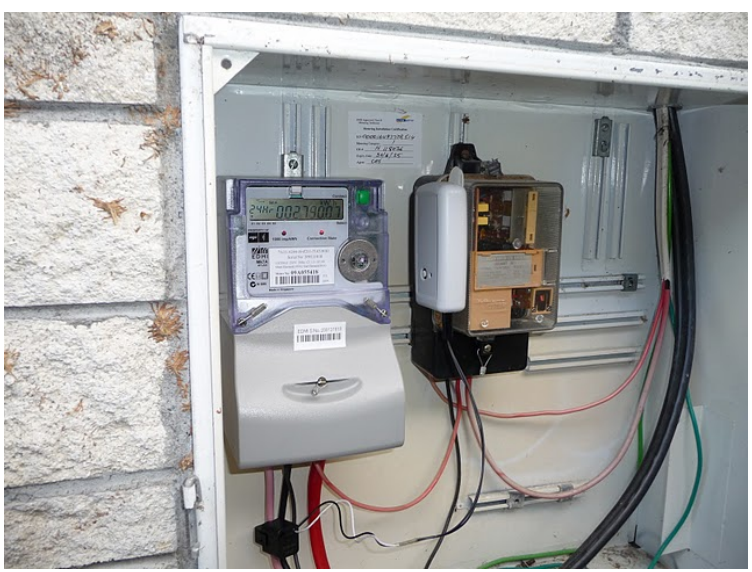
CyaSSL in Use!

Some examples of how CyaSSL Embedded SSL is being used

- Zigbee devices connecting to the cloud
- Radios in forklifts
- Printers
- Sensors
- Telepharmacy
- IP Telephony
- Super cool video games



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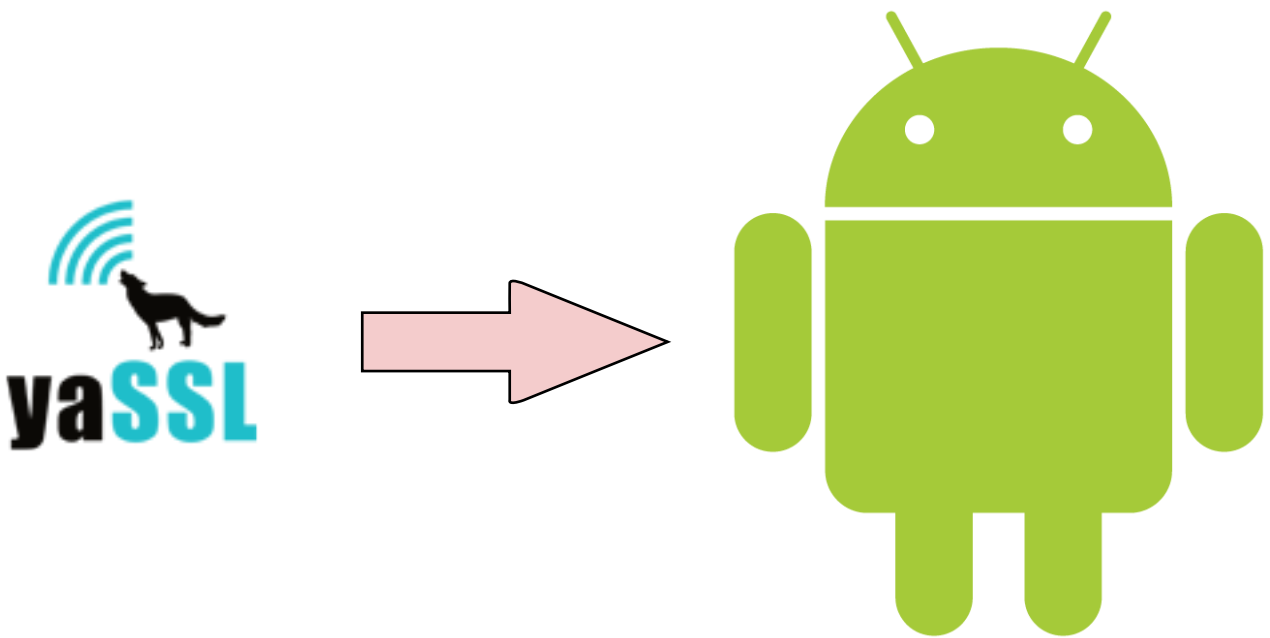
Porting **CyaSSL** to Android

- Java SSL Provider (CyaSSL)
- Can be installed alongside existing provider



CyaSSL support for **OpenWrt**

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Thanks!

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