Making Devices Simple, Secure and Scalable
About Arm

The architects of global possibilities

- Founded in 1990
- HQ in Cambridge UK with global offices across US, Europe and Asia
- Acquired by Softbank Group Corp. in 2016
- Shipped IP on +100B chips, set to ship 100B more by 2021

~6,000 Employees with major presence in San Jose, CA and Austin, TX

$1.8B in FY17 revenue

125B+ Arm-based chips shipped to date and counting
Arm is the architecture of choice for the Internet of Things

- 70% of the world’s population uses Arm technology
- 10M+ Arm-based Raspberry Pi devices have shipped to-date
- 90% of wearables powered by Arm-based SoCs
- >95% of world’s smartphones are based on Arm
IoT Services Group

Secure and scalable innovation from Device to Data

- > 30 PB of customer data managed
- ~ 50 million mobile devices directly connected
- > 2 million records per second ingested
- > 300K queries per day
- 55 TB network data flow per month
- 150+ modules and development boards
Unique approach to solving Data challenges

Flexibility and Scalability to address challenges from device to cloud
What Forrester discovered about IoT and data ...

- **38%**: IoT creates security, risk and compliance issues
- **89%**: are, or will, engage with a partner/vendor to maximize IoT solution value
- **12%**: valued security expertise in external vendors

Forrester: Survey of 150 organizations across manufacturing and materials, transportation and logistics, and consumer goods (Aug, 2018)
IoT use cases

**Smart buildings**
Efficient use of space and energy

**Utilities**
Load management, quality, maintenance

**Logistics**
Warehousing, transportation, asset-tracking, delivery
Key challenges for IoT deployments

**Investment return**
What is the value of data to my business?

**Security concerns**
Can the data be trusted? Does it make me vulnerable?

**Interoperability hurdles**
What is required to integrate IoT with current systems?
Deploying and managing IoT at scale
Arm Pelion IoT Platform Reduces Complexity
Device to data solution - built on a strong security framework

Applications Ecosystem
(App Development Enablement)

Harnessing IoT data
Data Management Services

Managing IoT devices
Device Management Services

Connecting IoT devices
Connectivity Management Services

Simplifying IoT devices
Device Ecosystem

Arm MBED Device OS
Pelion IoT Platform value proposition

Device + Connectivity management drive higher attach rate for data services

Connectivity Management Services
- Single pane of glass for operators of IoT ecosystem in various geographies
- Unified connectivity management

Device Management Services
- Hybrid cloud for regulated environments
- Unified client abstraction for fragmented device profiles

Data Management Services
- Trusted and managed data for any use case
- Rich data sets for analytics

Rich Platform for diverse use cases
Pelion Device Management
Any Device - IoT Device Classes

A landscape of multiple verticals, wide range of use cases and wide variety of devices
Pelion On Premises
Unlocking Possibilities for IoT Device Management

• Pelion On Premises is a deployment option for Pelion device management.

• Pelion On Premises provides identical features & capability parity with Pelion deployed as a managed service in public cloud

• Flexible deployment with OpenStack

• Turnkey solution as Managed Service
Pelion Device Management

Secure identity on-boarding, lifecycle management and update services for all IoT devices

One simple portal interface for all your IoT device management services

Support for any device, any vendor, any network and any cloud deployment

Built-in security from device to cloud

Secure asset and identity provisioning  Energy efficient connectivity  Endpoint and gateway device management  Firmware deployment and update campaigns  Endpoint / Gateway compute and access management
Trusted open-source OS for IoT products

**arm** MBED

- Standards-based leading connectivity and security stacks
- Thriving ecosystem of module, cloud and OEM vendors
- Reduce time to market going from prototype to production
Introducing Arm Mbed OS

An RTOS-based IoT Platform OS For Cortex-M embedded devices supported by a range of professional tools and the largest IoT ecosystem

Backed, free & Open Source IoT OS (not RTOS), delivering end to end connectivity and security, using the leading RTOS kernel based on CMSIS-RTOS used by millions of devices and optimised for Arm

Comprehensive selection of supported MCUs by leading silicon vendors optimised for IoT products.

Especially designed for IoT applications and include integrated Connectivity, Security, Management, and Drivers needed for IoT

Enabling the widest range of connectivity technologies support including BLE, WiFi, Cellular, WiSun, Thread, NB-IoT, LoRa

Delivering the foundation for building secure systems with Platform Security Architecture (PSA) & Trustzone

Mbed OS reduces development cost, time and risk for developing IoT products
Multi-Protocol Connectivity

IoT systems need secure, cost effective connectivity for a diversity of device applications
Secure IoT starts within the device with our Platform Security Architecture (PSA) & Trustzone, The foundation for building secure systems.

- **Channel Security via Mbed TLS**
  - Authentication, confidentiality and integrity

- **Device Security via PSA**
  - PSA-Compliant opaque cryptography, secure storage and secure boot

- **Lifecycle Security via Pelion**
  - Pelion-Trusted firmware update, provisioning and device-based authorisation

**Security separation**
Isolate trusted resources from non-trusted
Reduce attack surface of key components

**Security throughout the system**
Applications, operating systems & drivers
CPU, interconnect, memory and peripherals

**Trusted hardware**
Fortified security for entire device lifecycle
Mbed OS tools: Making coding experience better

- Mbed Studio
  Free professional grade desktop IDE
- Mbed CLI
  Command Line Interface
- Mbed Compiler
  Free Online Compiler

Mbed OS Toolbox

- Import into Compiler
- Export to desktop IDE
- Send Pull Request from here
Pelion Device Management & Mbed OS

IoT devices
- Your software
  - Device application
- Device Management Client
  - Mbed TLS
- Mbed OS
- Device Management Edge
  - Non-IP devices

Pelion Device Management
- Device connectivity
  - Connect
- Secure identity
  - Provision
- Device management
  - Update

Web integrations
- Web interface
  - Device Management REST API and SDKs
- Your business
  - Web applications
  - 3rd party cloud
Mbed Enabled Hardware

Ported

- Supported on hardware from the leading silicon partners
- Not just the RTOS kernel – drivers, stacks, security and connectivity
- Tested in our hardware test farms

Portable

- Designed to be brought up quickly on new hardware, with full porting test framework
- Enables design flexibility, roadmap and portfolio, without hardware lock-in

150+
Mbed Enabled boards already supported

40,000+ Hours
Testing on hardware platforms in our test farms as part of a release
Extending Mbed to Cortex-A

Price-performance ratio of Cortex-A based devices continues to increase, making them ideal for:
- Complex IoT workloads
- Rapid product development

In the past many OEMs have built and maintained their own operating system:
- Expensive in time and cost
- Shortage of embedded developers
- Has lead to some shocking security failures

Device and data management shouldn’t be an afterthought:
- Quicker product development
- Reduced cost of ownership
- Enable large scale deployment
Mbed Linux OS Vision
An IoT Operating System based on the proven Linux kernel but reimagined for IoT

- **Designed for IoT**
  The Performance and flexibility of Cortex-A with the experience of Mbed

- **Secure**
  Integrated chip to cloud security. E.g. secure boot. TrustZone, app isolation

- **Quick & Easy**
  Faster to market & efficient to maintain with support and community of Arm Mbed

- **Centrally Managed**
  Deployment and lifelong device management made easy with Pelion

Delivering the freedom and power to deliver durable innovation at pace
Summary

Open

• Linux distribution built using Yocto
• Public GitHub repos in 2019
• Tested and supported on Mbed Enabled platforms
• Participate in the Mbed Community & Forum

Secure

• Boots Secure World using Trusted Firmware-A on ARMv7 and ARMv8
• Signed firmware images, signed kernel and block level filesystem integrity monitoring
• Kernel enforced application isolation using OCI compliant container runtime
• Trusted application in TrustZone

Convenient

• Code signing and deployment tools
• Automated test cases integrated with the Lava framework
• Firmware and application management with Pelion
Register Today!

To register and get insider access to the Developer Preview, please visit:

https://os.mbed.com/linux-os

- Developer preview Fall 2018
- First Release Spring 2019
Customer Success

Marketing activities that show shared success with end customers and demonstrate increased design wins
Integrator for secure site access management

**Need:** A platform to develop connected devices in an efficient and secure manner integrating to purpose build cloud application.

**Solution:** Cellular connected IoT access control and monitoring system; onboard, managed and updated by Pelion Device Management

**Outcome:** Eliminates onsite staffing, minimizes service visits and improves operational efficiencies. Demand in excess of 5,000 units over next few years from one customer
Electric Vehicle Charging Management Solution

Accelerating the Deployment of Electric Vehicle Charging Infrastructure

- Intelligent EV Charging Scheduling
- Real-Time EV Charging Monitoring & Control
- Remote Device Management & Software Updates

Arm Pelion

Pelion Device Management
Device Provision
Software OTA Update
Device Management

Arm Pelion

EV Charging Management System
Dashboard & APP

EnviroHub

Environmental Monitoring
Pelion Device Management – customer successes

One of Asia’s largest energy / utilities provider

**Need:** To deploy 30M Advanced Metering Infrastructure, and evolve from an electric power company to energy platform & service company

**Solution:** Mbed OS based WiSun connected Smart Meter and Pelion Edge Gateway; onboard, managed and updated by Pelion Device Management On Premises

**Outcome:** Reduces total development cost, faster time to market, improved efficiency and security.
Delivers full control over meters in the field, enabling KEPCO to share meter and user data with users and partners, securely
Pelion Device Management value to reduce complexity

**Challenges**

- **Device complexity**
  - wide range of diverse device classes

- **Heterogeneity of vendors**
  - multiple device vendors

- **Network connectivity**
  - multiple connectivity methods

- **Deployment options**
  - diversity in service deployment

**Benefits**

- **Any Devices**
  - Ultra-constrained to feature-rich devices
  - Cortex-M and Cortex-A with Mbed OS and Mbed Linux OS

- **Any Vendors**
  - deployment with multiple device vendors
  - Standard LwM2M protocol for device connectivity

- **Any Networks**
  - from narrow-band to high-speed networks
  - Secure and bandwidth-efficient protocols

- **Any Cloud**
  - deployment and vendor agnostic
  - Flexible API's and SDK's
Accelerating the IoT from device to data

- **Diversity**
- **Security**
- **Partnership**
Thank You
Danke
Merci
谢谢
ありがとう
Gracias
Kiitos
감사합니다
धन्यवाद
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