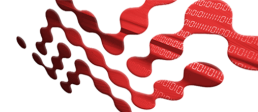


Linux-Based Open Source Embedded Platform for M2M

June 13, 2014



A Look at the Industry



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- No M2M tailored Linux distribution
- Do-it-yourself Linux is complex to setup, create, and maintain
- 54% of developers are considering using Linux*
- Availability of full source code was the #1 consideration when selecting an operating system*

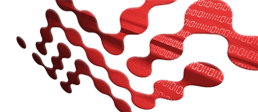


WHY LEGATO?

Need for Simplicity

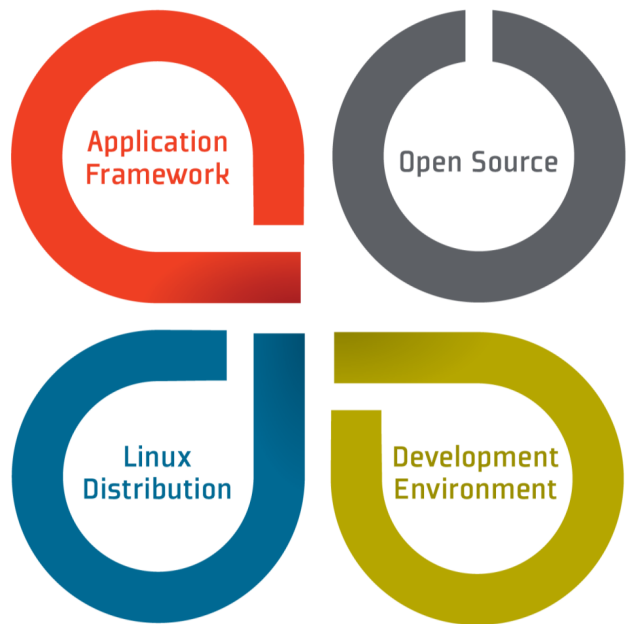
Demand for Linux-based solution in Open Source

Open Source Embedded Platform Built on Linux



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Designed to **simplify** embedded M2M development



Ready-to-run

Integrated, tested, validated

Ready-to-build

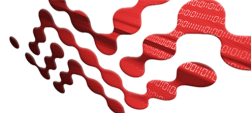
Open source, flexible foundation

Ready-to-connect

Any cloud, network, peripheral

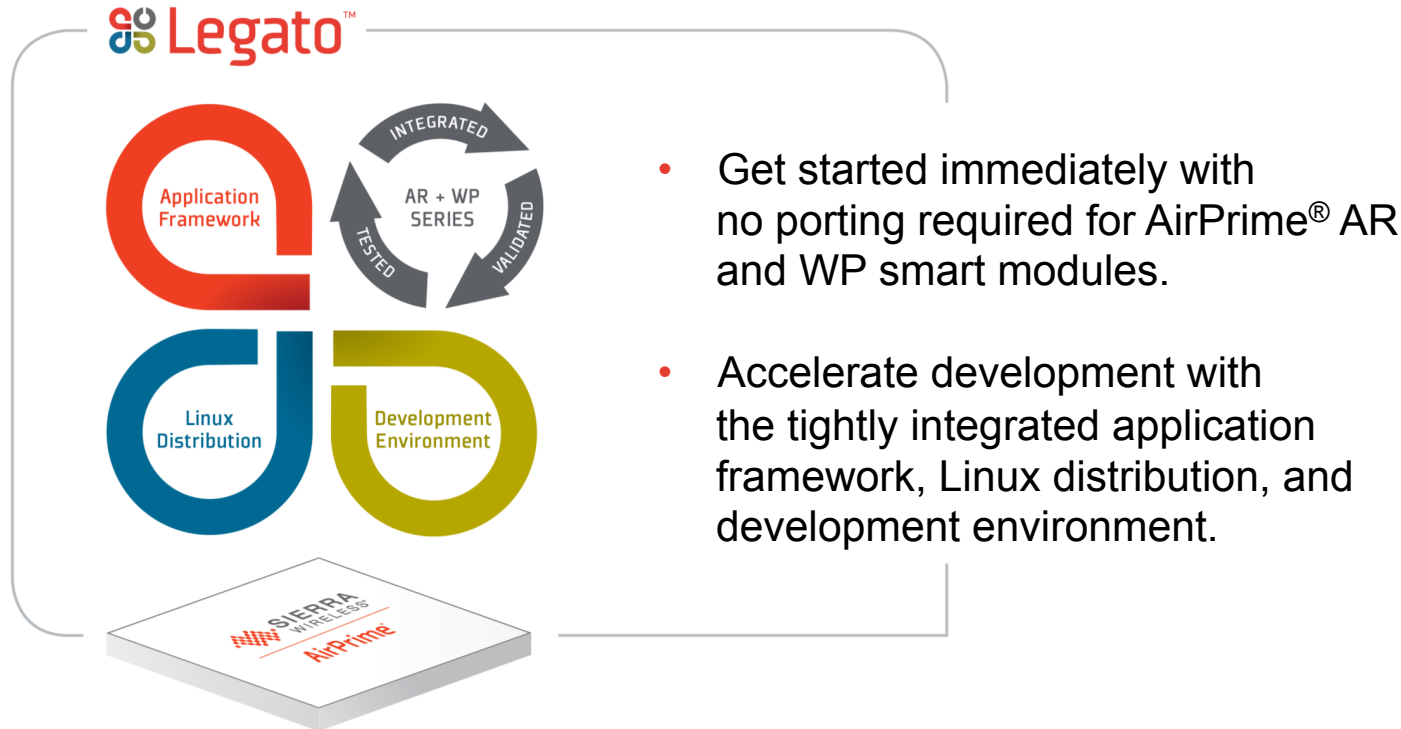


Ready-To-Run



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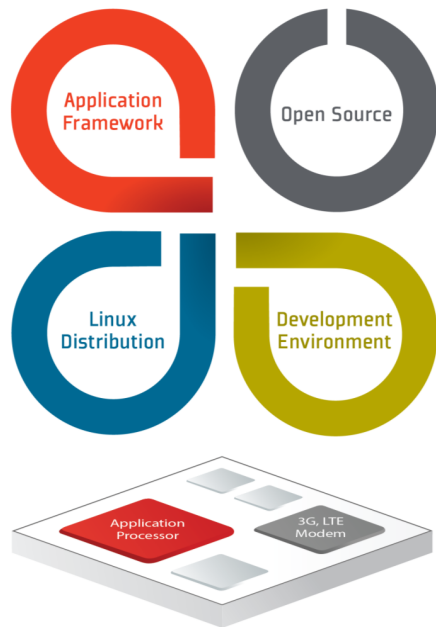
Integrated, tested, validated to work out of the box



Ready-To-Build

Open, flexible foundation to future-proof software investments

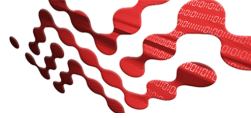
 Legato™



- Port to any application processor, no vendor lock-in.
- Save development time with customizable components.
- Utilize existing software and skillsets with multi-language support.



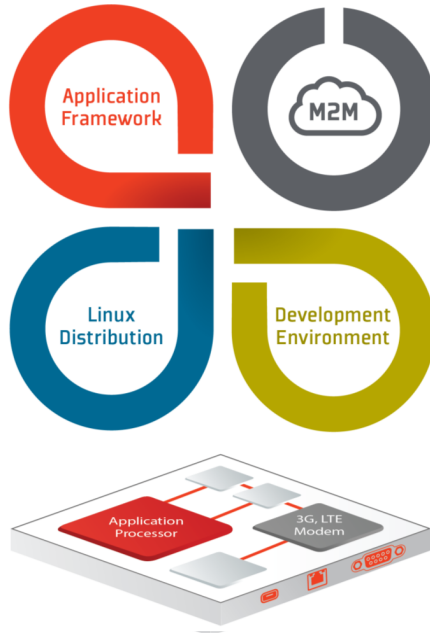
Ready-To-Connect



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Any cloud, any network, any peripheral

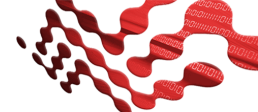
 Legato™



- Integrate valuable device data to the enterprise with the AirVantage® M2M Cloud.
- Connect to any mobile, wired, or personal network with no wireless expertise required.
- Access device peripherals like USB or Ethernet out-of-the box.

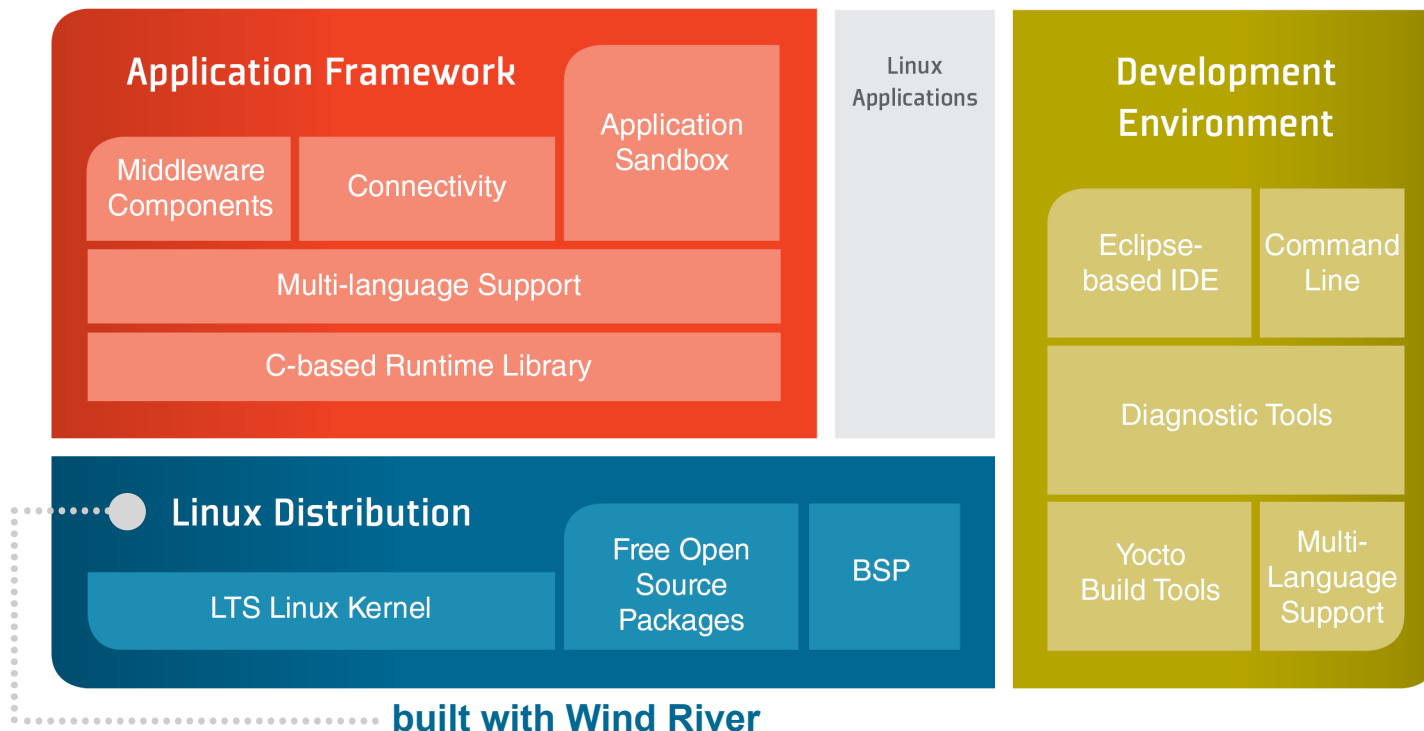


Components of the Legato Platform



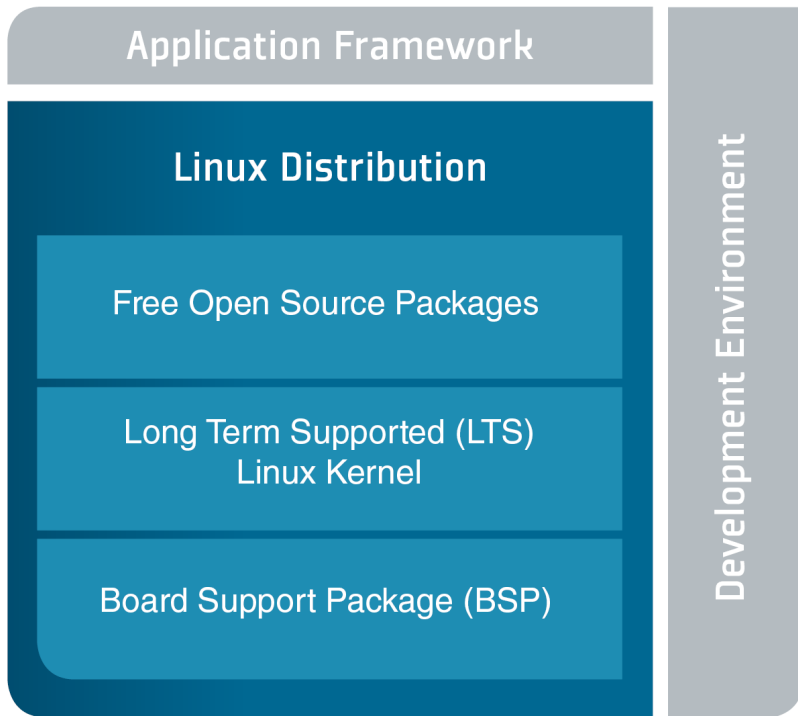
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Giving embedded M2M development a head start



Fully Tested Linux Distribution from Wind River

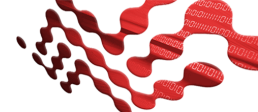
Customizable with built-in M2M features



- **Free open source packages** - validated by the Linux Foundation's Yocto project and include packages like BusyBox, OpenSSL, DHCP, PPP, and OpenSSH.
- **Long-term supported Linux kernel (LTSI)** - hosted by the Linux Foundation and maintained by the embedded systems industry.
- **Board support package (BSP)** - enables hardware interfaces and power management, validated on AirPrime WP and AR smart modules.

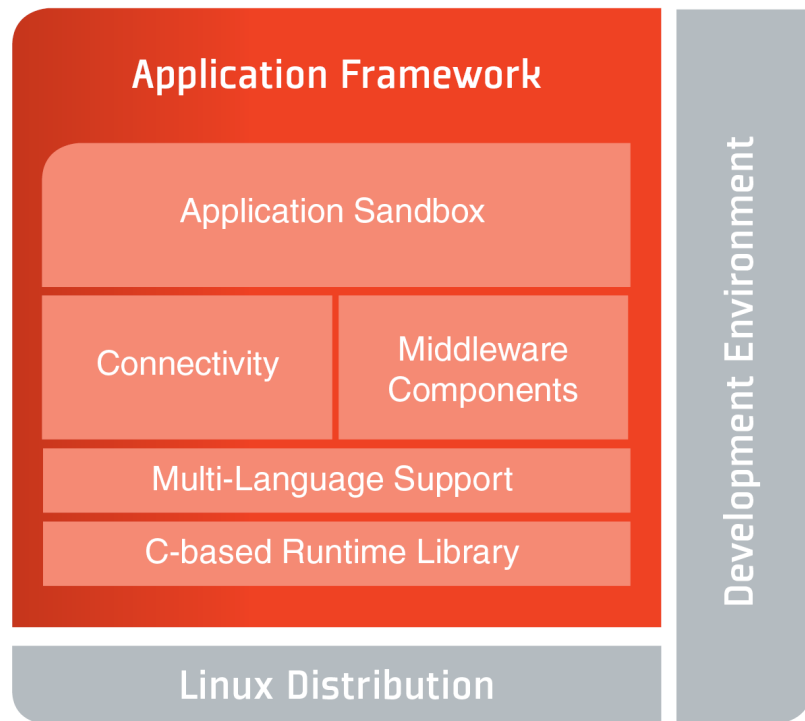


Tightly Integrated Application Framework



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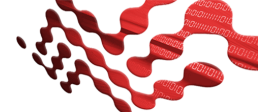
Designed with security and connectivity in mind



- **Application Sandbox** - secure environment to run and control multiple applications.
- **Robust Connectivity APIs** - access to cloud and network services such as voice calls, SMS, data, and radio controls.
- **Customizable middleware components** - validated building blocks such as configuration, database, logging, resource arbitration, and secure IPC.
- **Multi-language support** – utilize embedded applications in different programming languages.**
- **C-based runtime library** – fast, efficient system designed to maximize processing power and user application space.

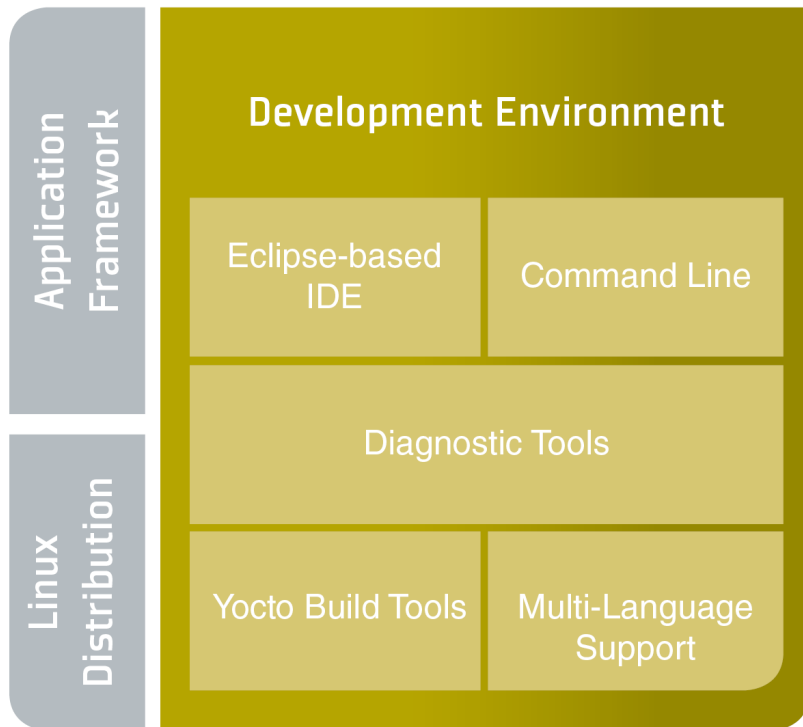


Feature-Rich Development Environment



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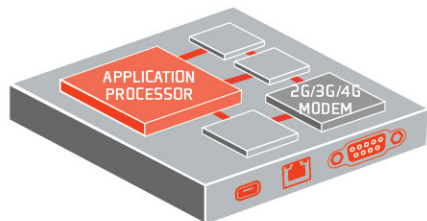
Flexible to simplify application level development



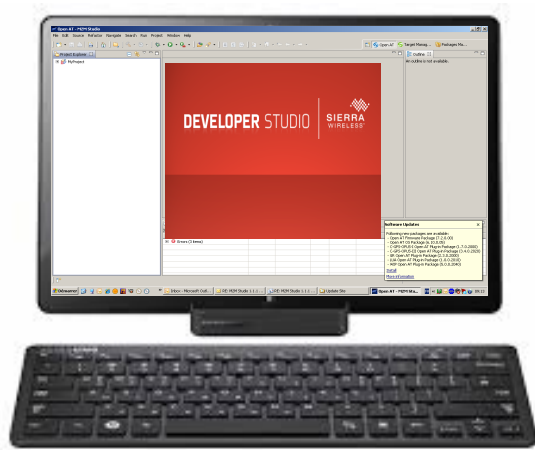
- **Eclipse-based integrated development environment (IDE)** - extensible and familiar toolset for application-level development with built-in API awareness.
- **Command Line** - automate builds and integrate into any tool chain.
- **Robust diagnostic tools** - local and remote debugging, troubleshooting, monitoring, and profiling.
- **Yocto build tools** - rebuild and tailor the Linux distribution for any project.
- **Multi-language support** - code using your favorite programming language.



Integrated Development Environment



- **Target Connection Management**
 - IP based connection through Ethernet, USB (Ethernet over USB) or UART (PPP)
 - Download the Linux Image and Root File System inside the target
 - Control target through shell
 - Read/Write embedded file system
- **Application Project Management**
 - Create/Edit/Delete Project
 - In-line Legato API documentation
 - Compile project with GCC toolchain
 - Manage app life cycle (Download/Install/Start)
 - Configure the target data base
 - Store and display logs from the target
 - Debug the application through GDB
 - OS awareness: memory map and consumption, process/thread activities
- **Compatibility**
 - Linux and Windows compliant (inc. cross toolchain)
 - For sandboxed and non-sandboxed applications



Legato Application Development

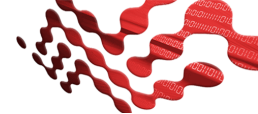


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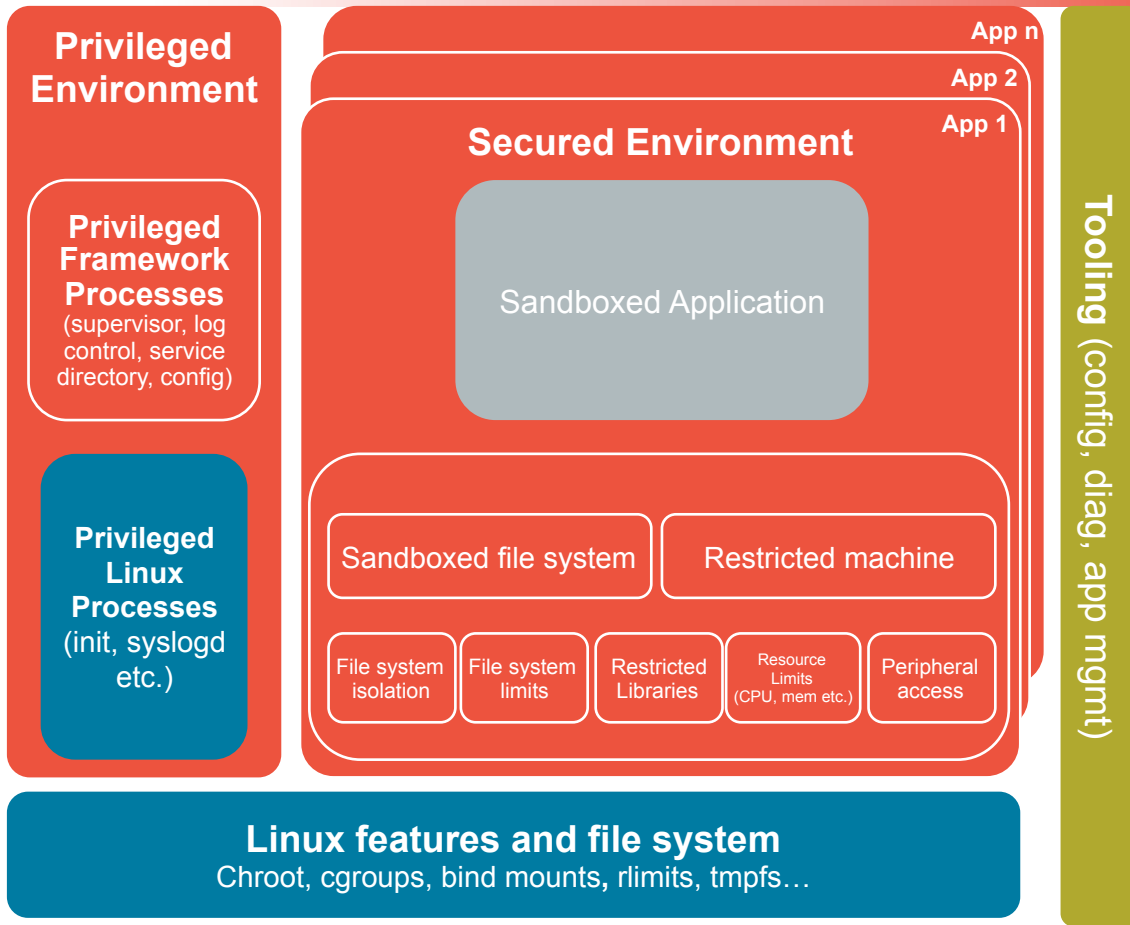


And now for something completely different ...

Application Sandbox



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Legato privileged processes

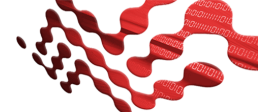
- Supervisor – manages all other processes
- Service Directory – advertises services and connects authorized clients to services
- Log control daemon – allows dynamic control of the logging levels and output types
- Configuration DB – provides a central repository to configure the whole device

Each application has a unique userid

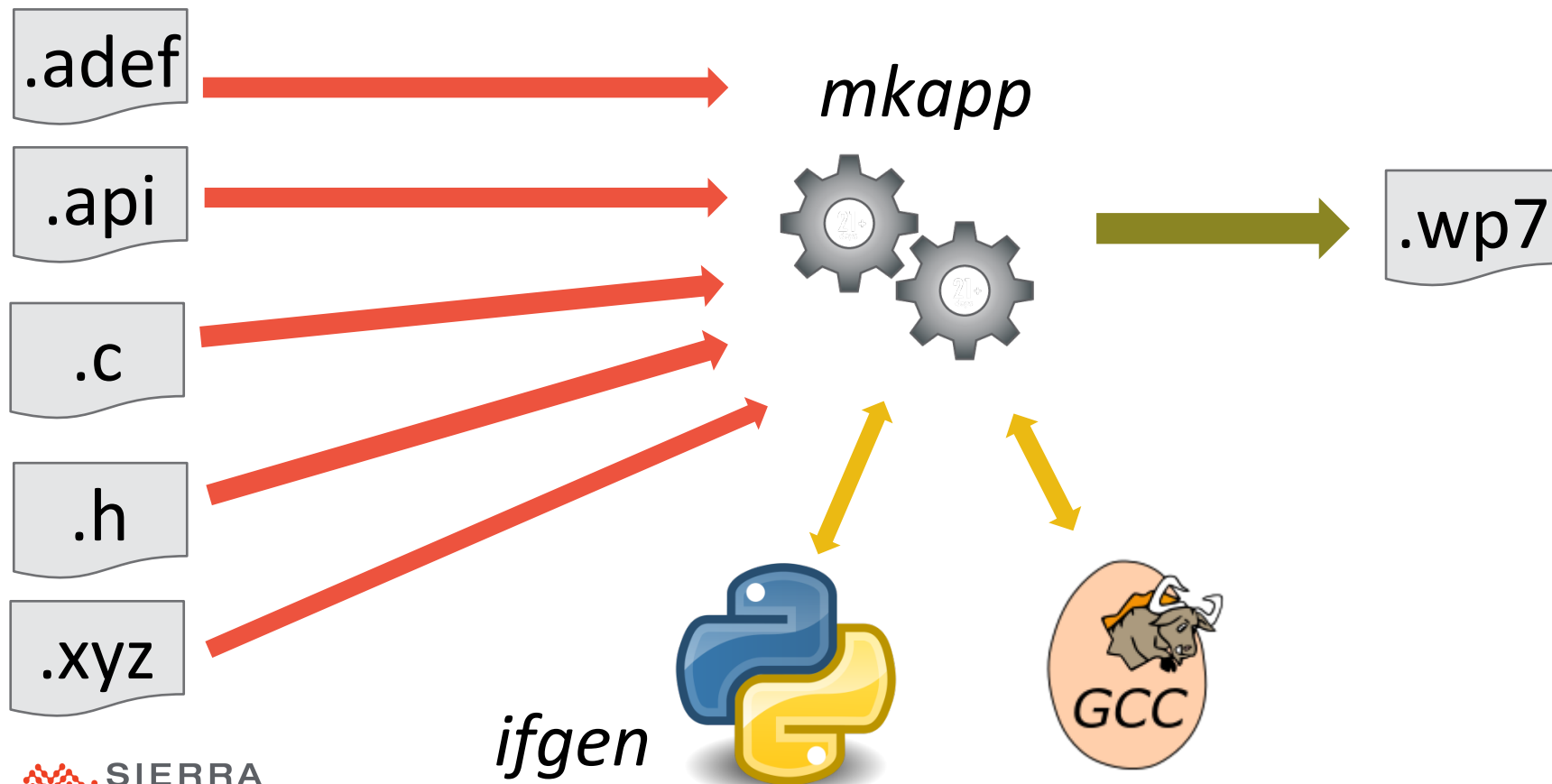
- These are created by the Supervisor on-demand and are destroyed when the application is removed.

Applications are in jail

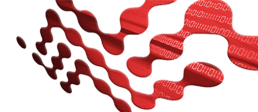
- The app can only see its own part of the file system
- It is not possible for the application to access unauthorized files or services
- Applications run with the lowest possible privileges



The pieces of a Legato app?



Defining the Sandbox



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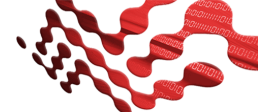
Wireless M2M smooth and connected

- ▼ Legato
 - ▼ Welcome
 - › Get Started
 - › Basic Concepts
 - › Create Applications
 - › Write Components
 - › Language Independent Interfaces
 - ▼ Legato Definition Files
 - ▼ Legato adef Files
 - adef processes
 - Legato cdef Files
 - › Build Tools
 - › Legato Demo Applications
 - › Legato Tools
 - › Connect to AirVantage
 - › Legato Services
 - › C APIs

Legato adef Files

sandboxed
start
numProcs
mqueueSize
rtSignalQueueSize
memLimit
cpuShare
fileSystemSize
files
executables
import
groups
processes

How Do I Get Started?



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Welcome to Legato GitHub.



**DEVELOPER
ZONE**

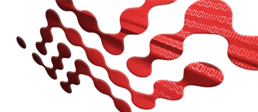


Sierra Wireless Developer Forum

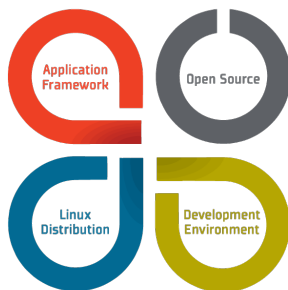
Please register at www.sierrawireless.com/register to use this forum



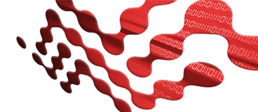
Legato USB Quick-Start



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First Legato Developer Challenge!



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Build the coolest Legato app in under 2K lines

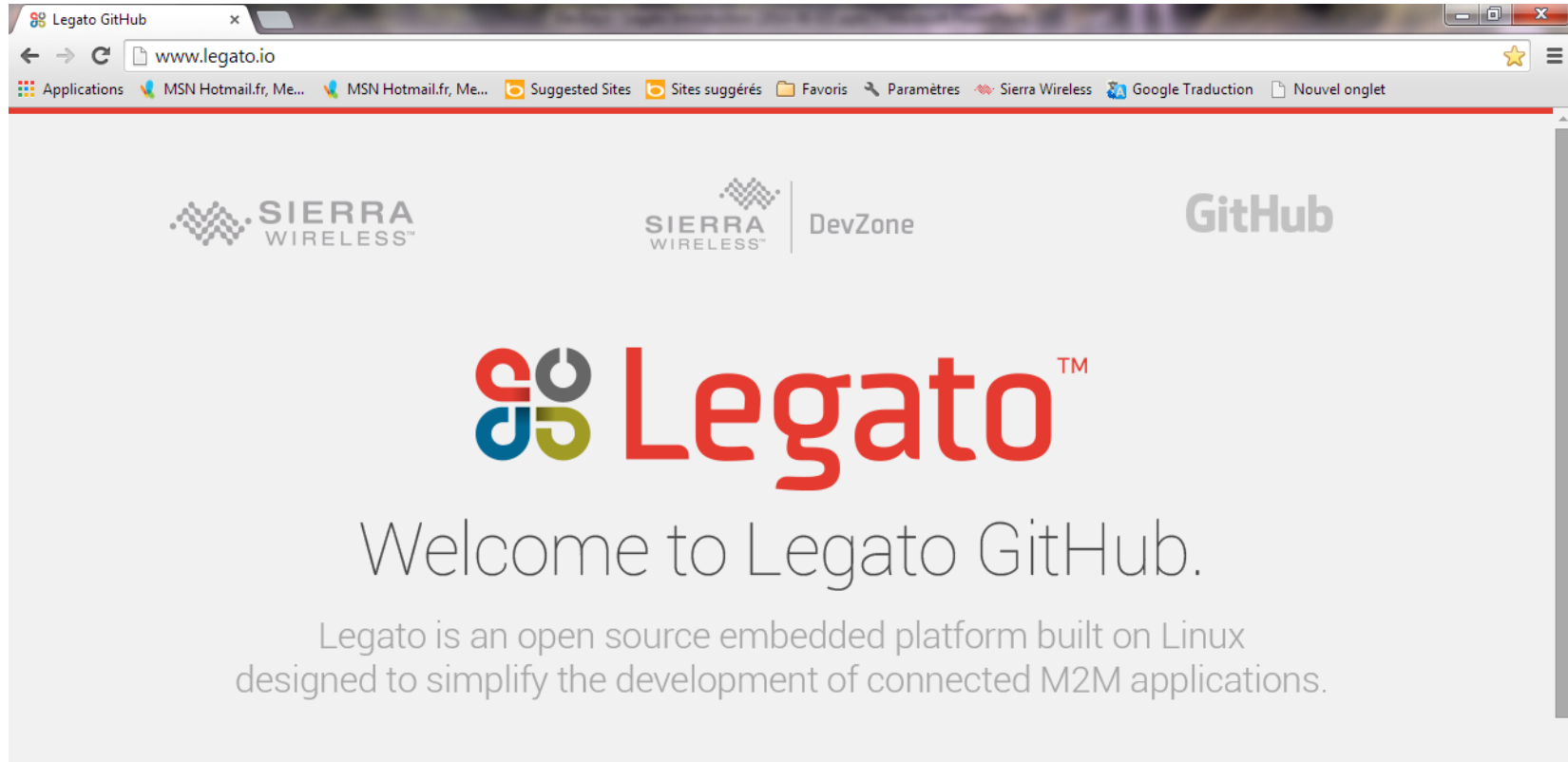
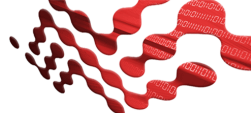
Your apps will be judged based on:

- Using framework features
- Incorporating cellular functionality
- Connectivity to the AirVantage M2M Cloud

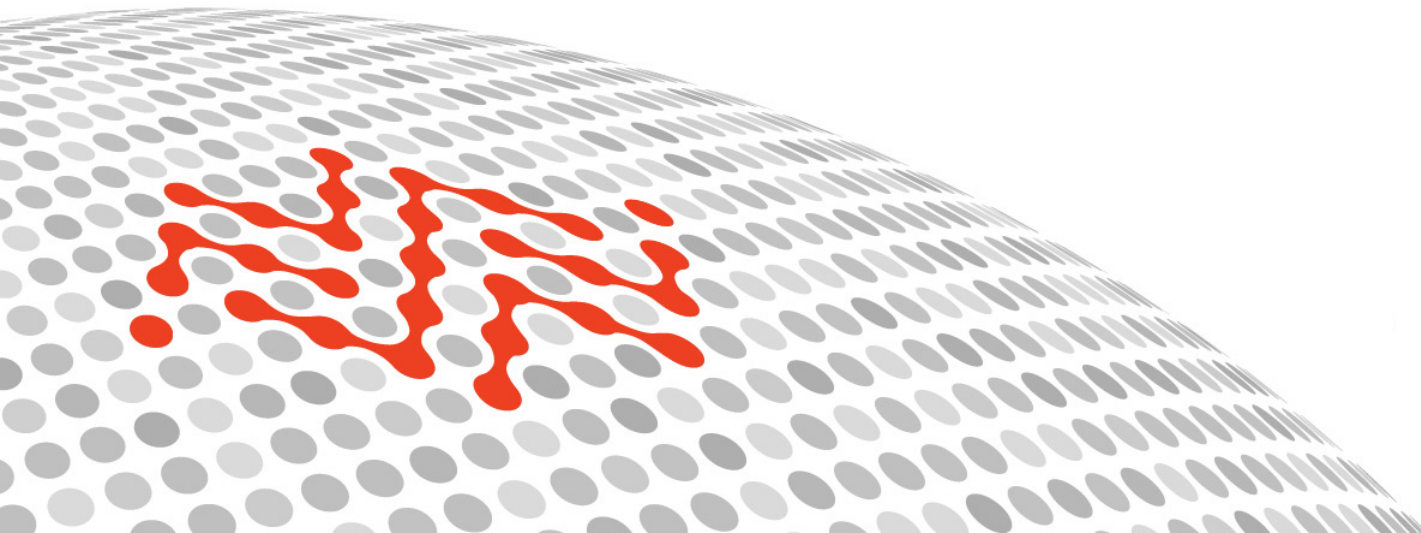
Contest will run from July 1-29 (4 weeks) with a live online showcase of the top apps and winner announcement on July 31.

Prizes!!





Thank You



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