Security Model of Firefox OS

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Soutenance mini-projets SSR, 2013

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History

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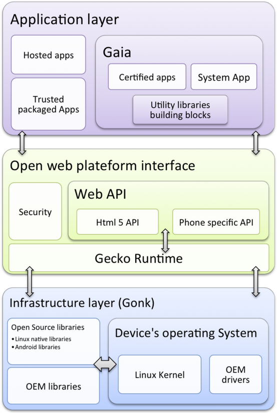
Architecture

- Architecture in 3 layers : Gonk, Gecko, Gaia



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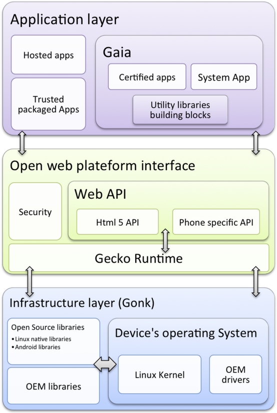

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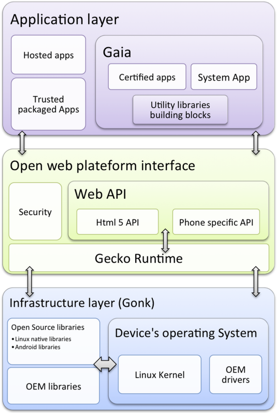

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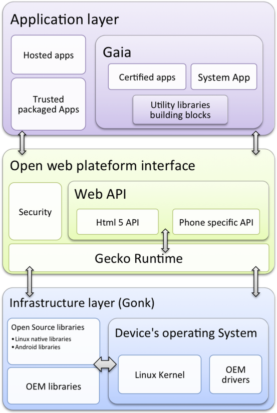
- Gecko : Mozillas layout engine
- Gaia : The user interface (HTML5 web applications)



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{
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  "launch_path": "/",
  "icons": {
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- Javascript functions divided in separate APIs (Application Programming Interfaces) for security

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Hardware

- Support for Android 4.0
- Constructors : Alcatel, ZTE, LG, Huawei and Foxconn
- First Firefox OS phones : Alcatel One Touch Fire & ZTE Open

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3. Security Implementation
   - User Side
   - Application developpement
   - System architecture
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Mechanisms

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- Divided in 3 role points of view
  - User side
  - Application developpement
  - System architecture

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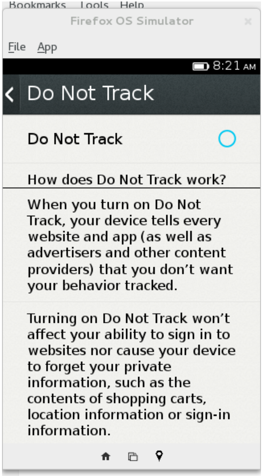

Do Not Track

Do Not Track ○

How does Do Not Track work?

When you turn on Do Not Track, your device tells every website and app (as well as advertisers and other content providers) that you don't want your behavior tracked.

Turning on Do Not Track won't affect your ability to sign in to websites nor cause your device to forget your private information, such as the contents of shopping carts, location information or sign-in information.

- Some apps require user approval before using some APIs

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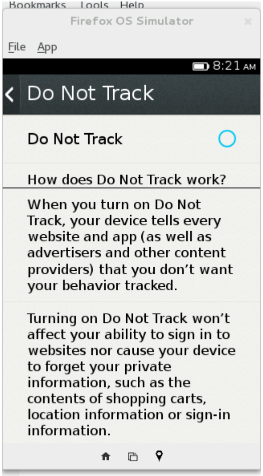

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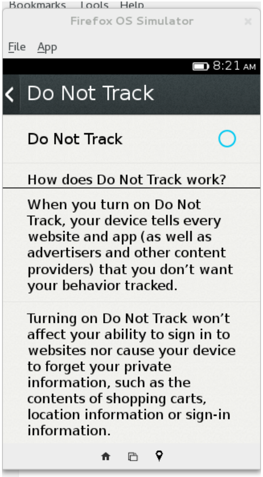

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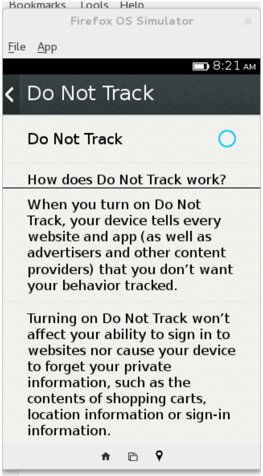

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- Strong emphasis on privacy
- But : Level of configuration very light

App permissions

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- Certified apps have implicit ALLOW rights for almost all APIs
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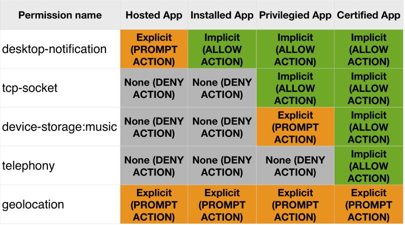

Permission name	Hosted App	Installed App	Privilegied App	Certified App
desktop-notification	Explicit (PROMPT ACTION)	Implicit (ALLOW ACTION)	Implicit (ALLOW ACTION)	Implicit (ALLOW ACTION)
tcp-socket	None (DENY ACTION)	None (DENY ACTION)	Implicit (ALLOW ACTION)	Implicit (ALLOW ACTION)
device-storage:music	None (DENY ACTION)	None (DENY ACTION)	Explicit (PROMPT ACTION)	Implicit (ALLOW ACTION)
telephony	None (DENY ACTION)	None (DENY ACTION)	None (DENY ACTION)	Implicit (ALLOW ACTION)
geolocation	Explicit (PROMPT ACTION)	Explicit (PROMPT ACTION)	Explicit (PROMPT ACTION)	Explicit (PROMPT ACTION)

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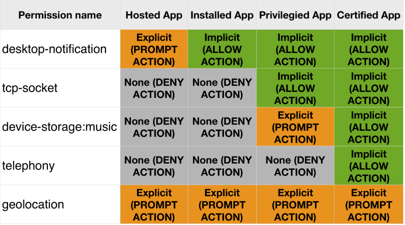

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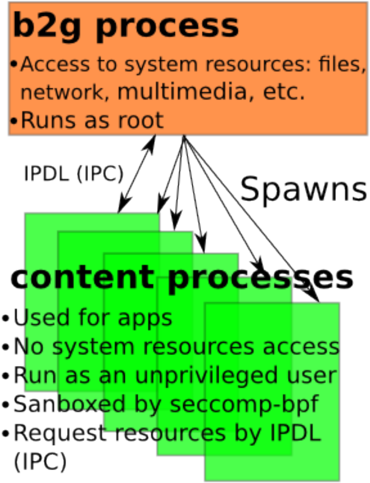
- Authorization must be requested in manifest file

b2g and content processes



b2g process

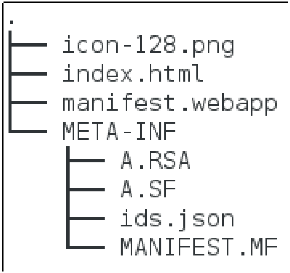
- Access to system resources: files, network, multimedia, etc.
- Runs as root

content processes

- Used for apps
- No system resources access
- Run as an unprivileged user
- Sanboxed by seccomp-bpf
- Request resources by IPDL (IPC)

App signing for packaged apps

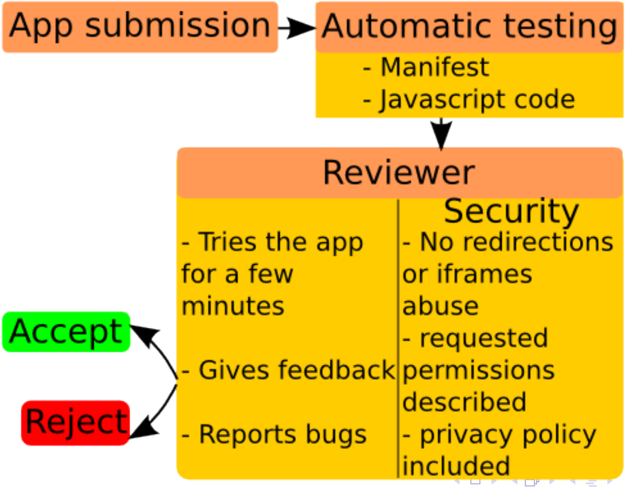
- Goals: integrity, non-repudiation of the developer and ensure that the app has been reviewed
- Cryptographic functions of Firefox (SHA-1, PKCS #7)
- Security of maketplaces not run by Mozilla?
- Patches for updates developed but not integrated into the main codebase yet



```
.
├── icon-128.png
├── index.html
├── manifest.webapp
└── META-INF
    ├── A.RSA
    ├── A.SF
    ├── ids.json
    └── MANIFEST.MF
```

Figure : my_signed_app.zip

App validation



App submission

Automatic testing
- Manifest
- Javascript code

Reviewer

- Tries the app for a few minutes
- Gives feedback
- Reports bugs

Security
- No redirections or iframes abuse
- requested permissions described
- privacy policy included

Accept

Reject

Sandboxing

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  - etc.
- **Seccomp-bpf** to sandbox system calls (e.g., exit, read or write functions)

Address Space Layout Randomization (ASLR)

Randomizing memory space layouts to prevent memory corruption

First run of the "cat" program on Linux 64 bits (simplified)

Start Address	End Address	Label
00400000	0040b000	/usr/bin/cat
012b1000	012d2000	heap
7f144b0fa000	7f144b29d000	/usr/lib/libc-2.17.so
7fff9c2e1000	7fff9c302000	stack

Second run

Start Address	End Address	Label
00400000	0040b000	/usr/bin/cat
0141d000	0143e000	heap
7fb4ed9fe000	7fb4edba1000	/usr/lib/libc-2.17.so
7fff0a408000	7fff0a429000	stack

File system hardening (1)

- Goals: prevent information leaks, privilege escalation and execution of native code
- Give read-write rights only to areas with user content
- File system hardening is based on Android

File system hardening (2)

Mount point	File system	Options
/	rootfs	read-only
/dev	tmpfs	read-write, nosuid, noexec, mode=0755
/proc	proc	read-write, nosuid, nodev, noexec
/cache	yaffs2 or ext4	read-write, nosuid, nodev, noexec
/system	ext4	read-only, nodev
/data	ext4	read-write, nosuid, nodev, noexec
/mnt/sdcard	ext4 or vfat	read-write, nosuid, nodev, noexec, uid=1000, fmask=0702, dmask=0702

Table : (Simplified) Filesystem Mounts

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- Security Vendors
- Difficult to upgrade Android on a device

iOS

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- But a jailbreak is released as soon as a new iOS version is out
- Limited malware due to strict restriction of the App Store
- Reduced attack surface due to external software

Blackberry

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- In May 2013, Blackberry 10 first mobile platform approved by the U.S. DoD for future agency use

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- No Java or native code code but web technologies: magnified web attacks?