



# Get your port on!

porting to Native Client  
as of Pepper 18

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# Getting Started

[gonacl.com](http://gonacl.com)



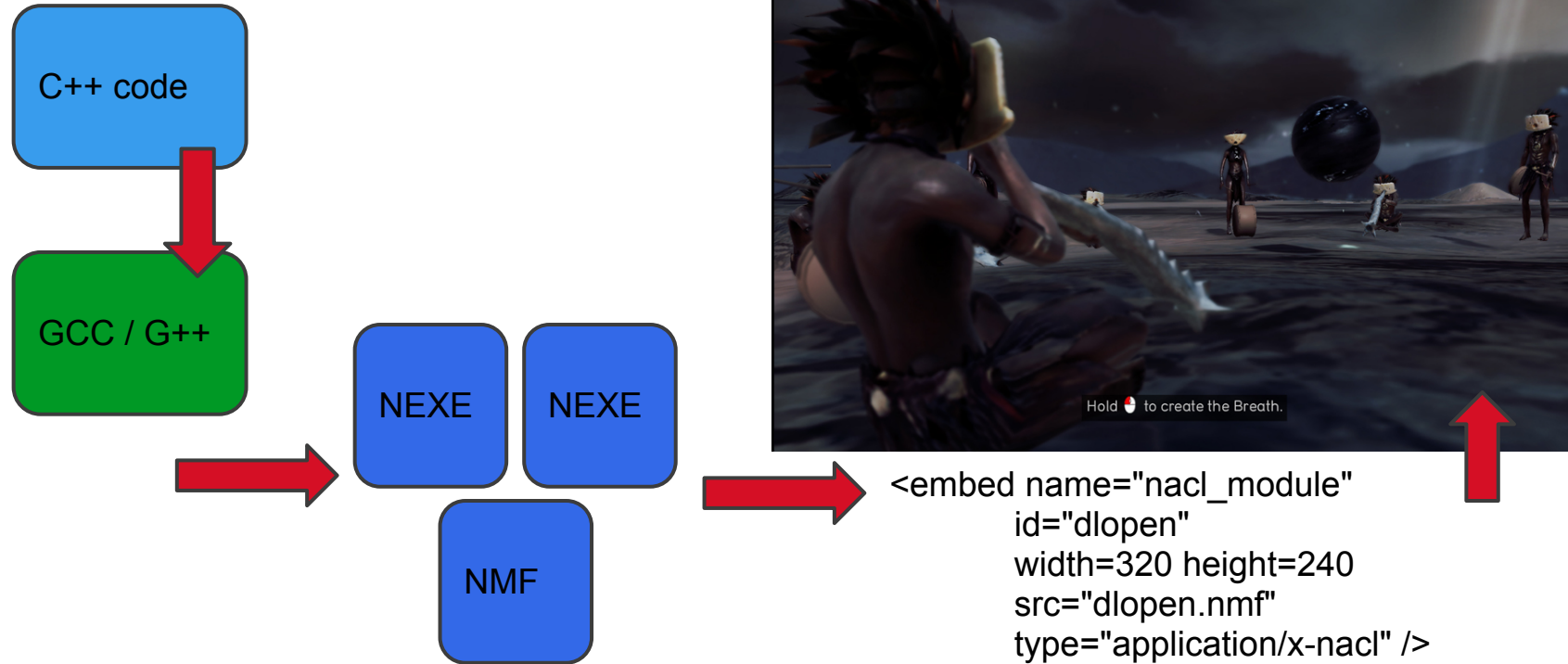
# It works!



Native Client runs C++ code in a web page

No plug-in required

# The Gist



# **GCC \ G++ compiler**



**Make C++ code ISO/IEC 14882:1998 compliant**

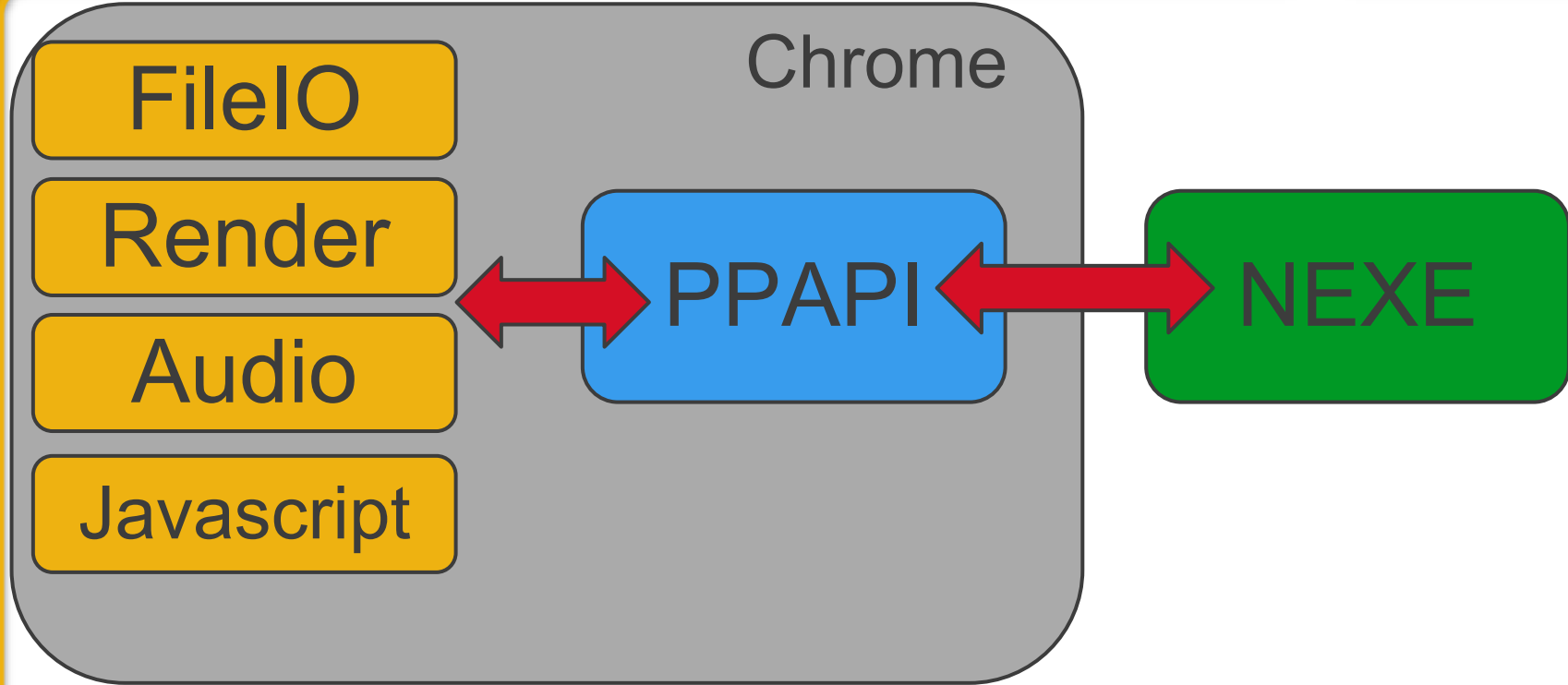
POSIX style coding / functions

OS specific calls not supported

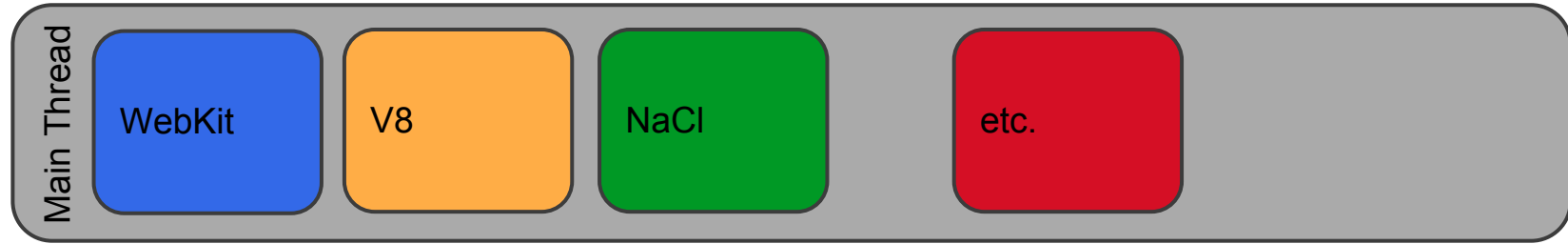
**Removes / tests any unsafe code**

**Produces safe compiled x86 code**

# Pepper API - PPAPI



# Pepper Thread



Do not call blocking functions on main thread

# Pepper API



Pepper APIs calls are Asynchronous

~1 'frame' to get results

Must be called from the main thread <will be fixed soon>



# Pepper API



```
void fopen_mt(void* void_data, int32_t /* unused */) {  
    ASSERT_MAIN_THREAD();  
    FileIO::OpenParams* params =static_cast<FileIO::OpenParams*>(void_data);  
    file_io_->Open(*file_ref_, params->flags, pp::CompletionCallback(fopen_cb,params));  
}  
  
void fopen_cb(void* void_data, int32_t result)  
{  
    //Yay, do some stuff!  
}
```

# Working around this.



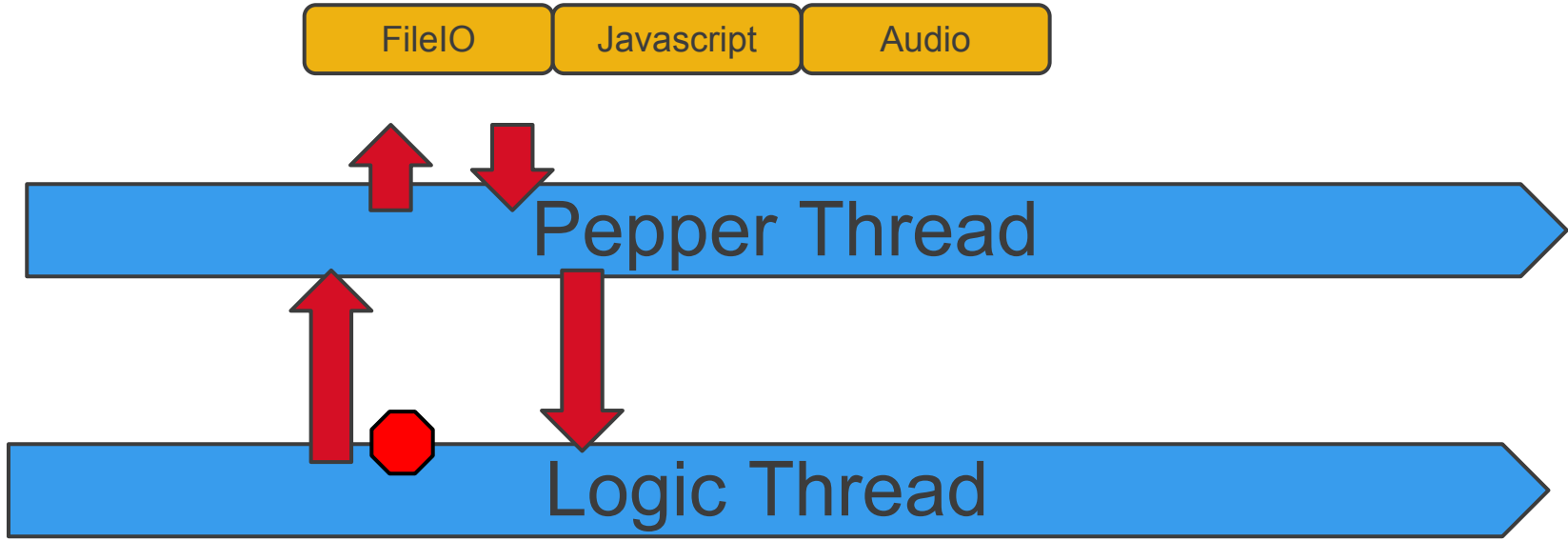
This is not how your game engine is designed

Best idea?

Run game logic on separate thread

Wrap platform functions to talk with main thread.

# Logic Thread



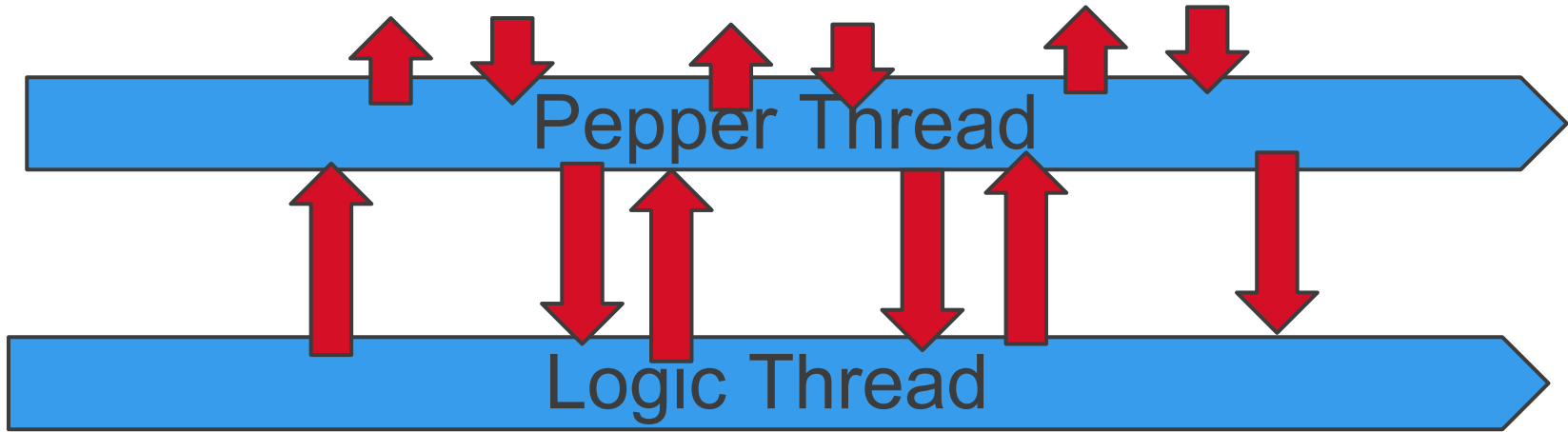
# Helper fcn call



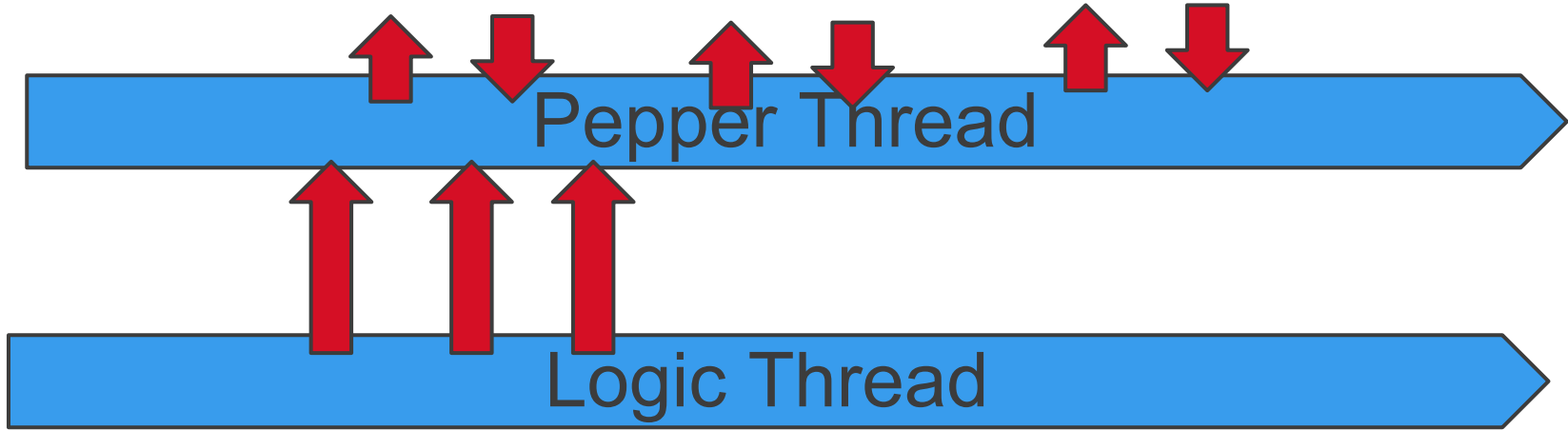
```
static int32_t RequestAndWait(void (*function)(void*, int32_t), void* param)
{
    ASSERT_WORKER_THREAD()
    pp::Module::Get()->core()->CallOnMainThread(0, pp::CompletionCallback(function, param), PP_OK);
    pthread_cond_wait(&gData_.cond, &gData_.mutex);
    return data_.result;
}
```

```
static void ReturnFromMainThread(void* void_data, int32_t result)
{
    ASSERT_MAIN_THREAD();
    MainThreadData* data = static_cast<MainThreadData*>(void_data);
    data->result = result;
    pthread_cond_signal(&data->cond);
}
```

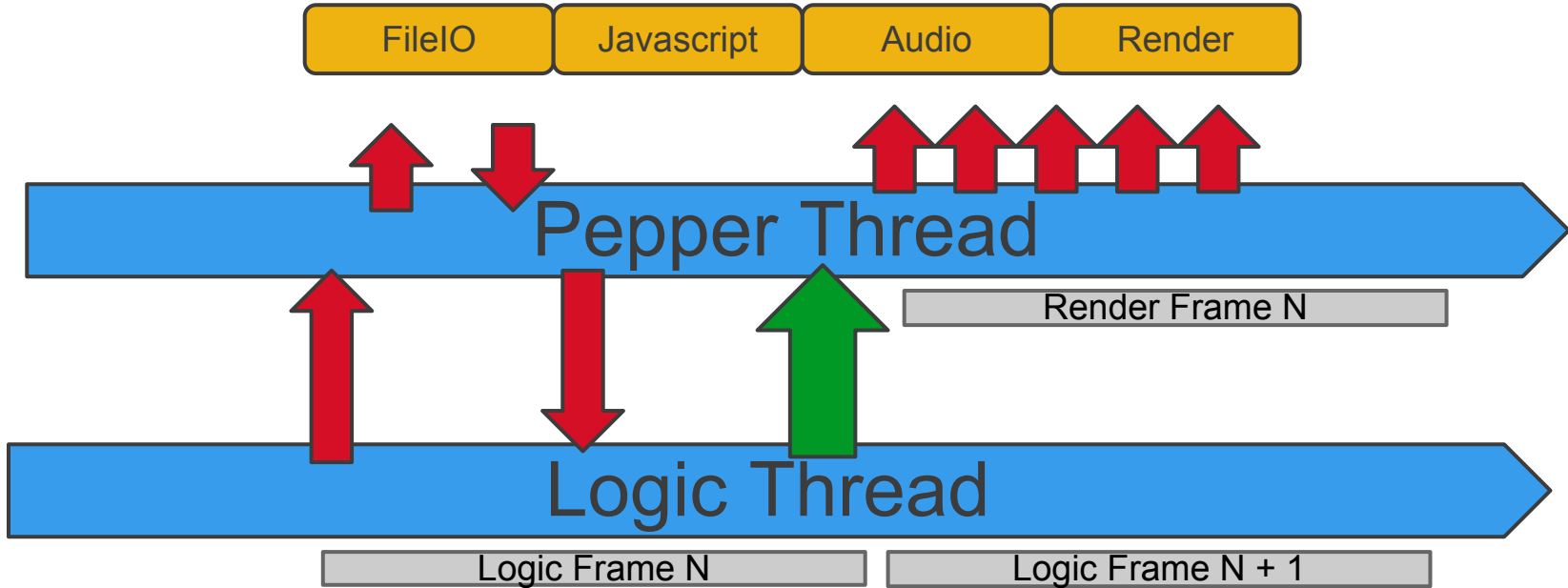
# Logic Thread



# Logic Thread



# Logic Thread

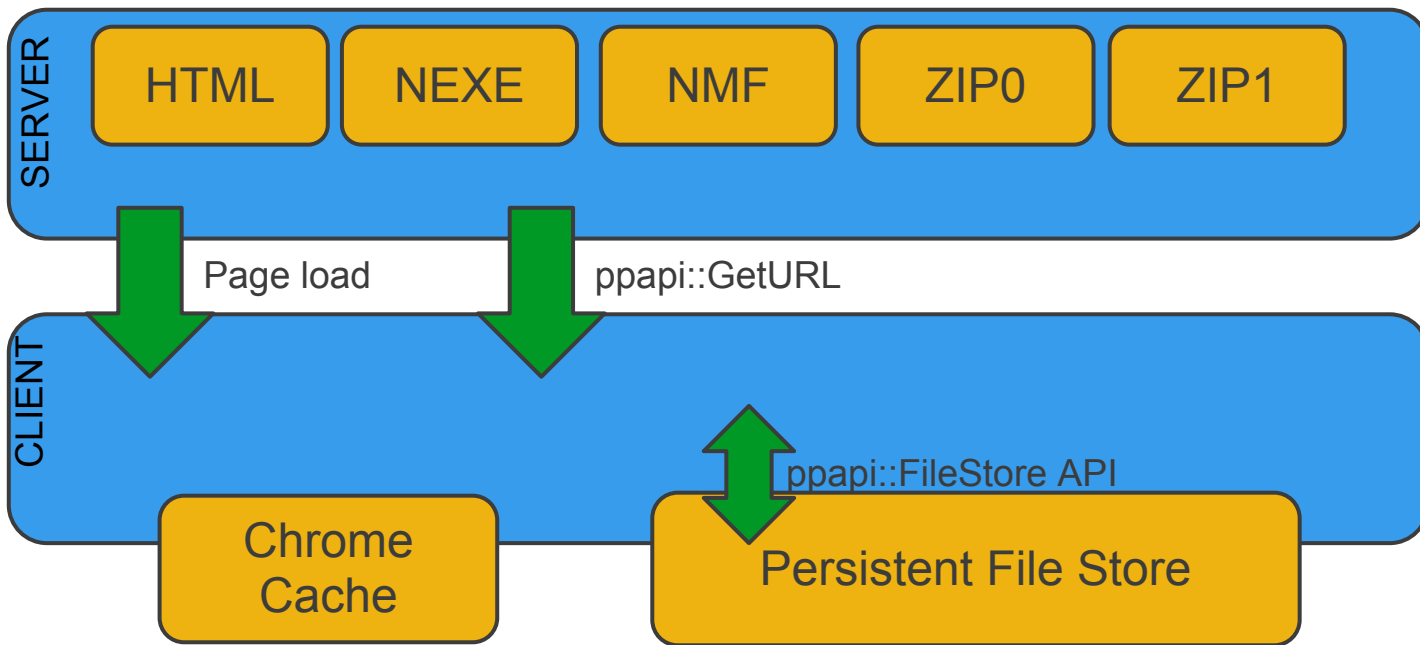


# Get Ported



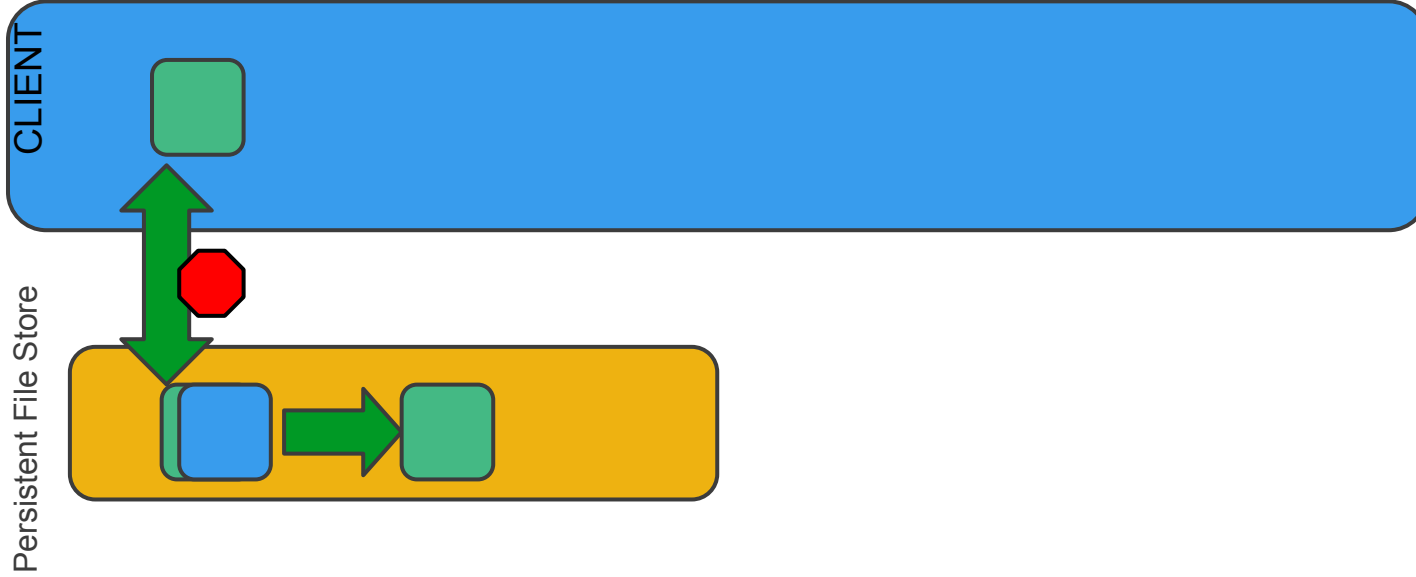


# FileIO



more - [link](#)

# FileIO & shutdown



# Dev FileIO - Dangerous



## Developer mode - Write direct to disk

```
[path_to_chrome]> set NACL_DANGEROUS_ENABLE_FILE_ACCESS=1  
[path_to_chrome]>chrome.exe --no-sandbox
```

```
...  
FILE* pFile = fopen("tracelog.txt","wt");  
fwrite(...);
```

```
[path_to_chrome]\ [build_number] \tracelog.txt  
C:\Program Files (x86)\Google\Chrome\Application\19.0.1041.0\tracelog.txt
```

More - [link](#)

# Rendering



Port your game to use OpenGL ES 2.0

Use ANGLE to port on windows

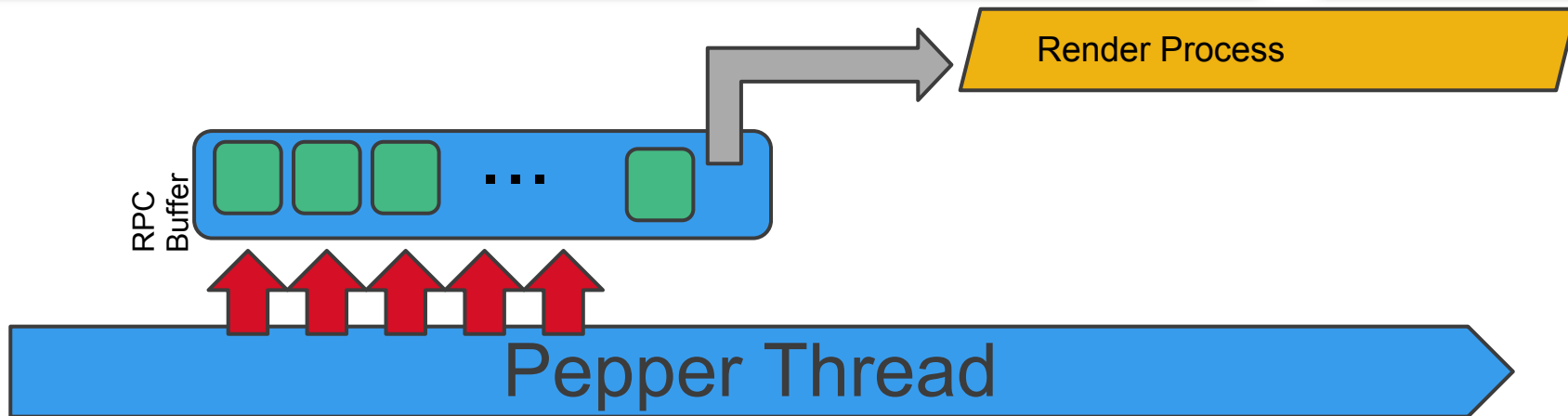
Note that OGLES2.0 is NOT OGL!

Stricter set of compiler rules

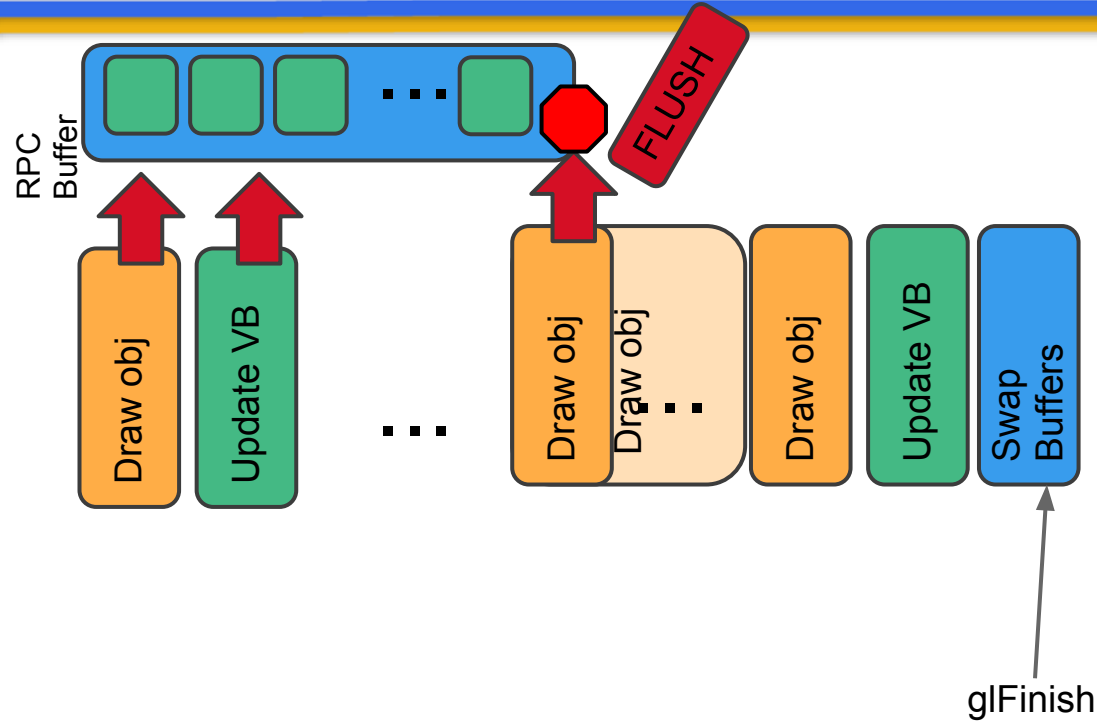
Not all extensions available

API nuances

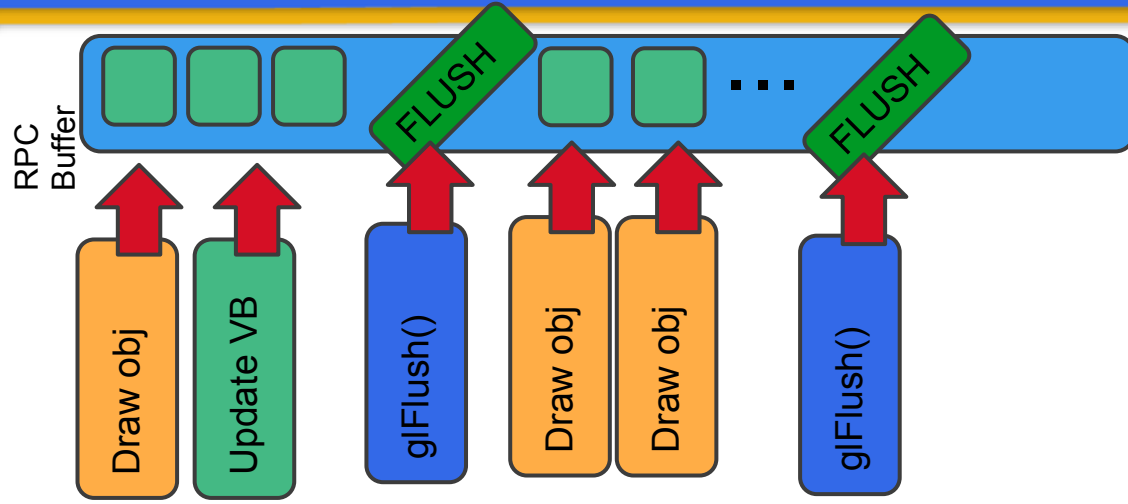
# Sandbox Rendering



# Render Stalls



# Render Stalls



# 3D and the web



3D APIs can be malicious in the web

WebGL has a 'blacklist' of 3d drivers

Failure to create a webgl context

Detect early and alert user!



# Blacklisted driver test



**//has blacklisted hardware / feature sets?**

```
function textureSizeTest(size) {  
    var canvas = document.createElement('canvas');  
  
    var gl = canvas.getContext('webgl') ||  
             canvas.getContext('experimental-webgl');  
  
    if (gl)  
        return gl.getParameter(gl.MAX_TEXTURE_SIZE) >= size;
```

more - [link](#), and `load_progress` example in SDK

# Working in a browser



# NaCl White listing



Nacl not enabled until :

Devs - enable via flags

Users - Install from Chrome Web Store

Origin of Location white listed

NMF and Nexx loc must match!

# Can the user run NaCl?



**//is using chrome**

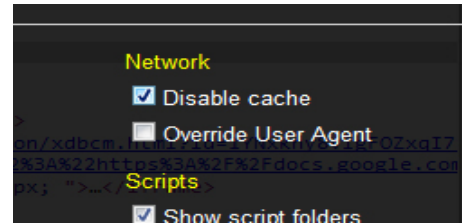
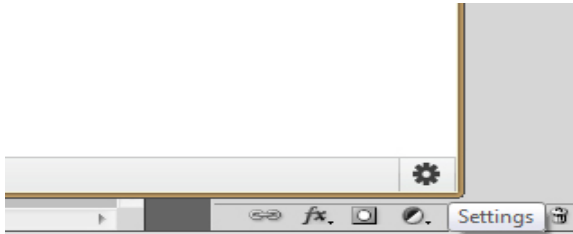
```
var is_chrome = navigator.userAgent.toLowerCase().indexOf('chrome')  
> -1;
```

**//is app installed**

```
if (window.chrome.app.isInstalled)  
    // You're running as an installed app, via the app launcher!  
else  
    // You're running via a bookmark/link.
```

more - [link](#), and load\_progress example in SDK

# Turn off caching (dev only!)



# Chrome developer tools - [link](#)



Developer Tools - http://www.google.com/

Elements Resources Network Scripts Timeline Profiles Audits Console

Search Elements

Zoom 100%

Save page as... Ctrl+S  
Find... Ctrl+F  
Print... Ctrl+P  
Tools  
History Ctrl+H  
Downloads Ctrl+J  
Sign in to Chrome...  
Options

Create application shortcuts...  
Extensions  
Task manager Shift+Esc  
Clear browsing data... Ctrl+Shift+Del  
Report an issue...  
Encoding  
View source

Elements Resources Network Scripts Timeline

Search Network

Name	Met...	Status	Type	Initiator	Size	Time	Timeline
Path		Text			Conte	Laten	
/chrome/devtools/doc	GET	OK	imag...	Parser	26.90K	110ms	709ms
plus.google.com	GET	200	text/...	plusone.is:24	43.70K	138ms	1.08s
plus.google.com/_ap	GET	OK	text/...	Script	122.22	115ms	1.42s
hide-arrow.gif	GET	200	imag...	codesite hea	968B	169ms	
/images	GET	OK	imag...	Script	106B	123ms	
get_projects	POST	200	text/...	codesite hea	768B	155ms	
/apis/ajax/playgrounc	POST	OK	text/...	Script	72B	143ms	

# Tracing



## Tracing

Record

Load

Save

1790 ms 1800 ms 1810 ms 1820 ms

1400: CrRendererMain:



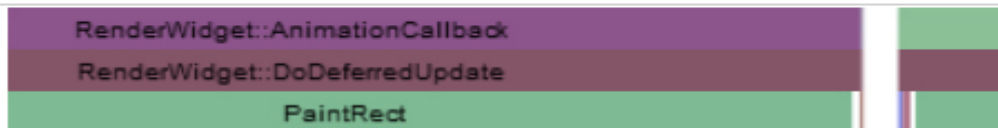
2252: CrRendererMain:

3372: CrRendererMain:

RenderWidget::AnimationCallback

RenderWidget::DoDeferredUpdate

PaintRect



# The Google Stack





# power.



Distribute & Discover  
Chrome Web Store



Analyze and tweak  
Google Analytics



Identity & Social  
G+



Serving & database  
Google App Engine



Monetize  
Google Wallet

YOUR GAME

# gonacl.com



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