

js-ctypes

ネイティブコードを呼び出す新しいカタチ

共有ライブラリを
JavaScriptから呼び出す

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今までは共有ライブラリの
呼び出しはできなかったの？

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xptcall

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JavaScriptから呼び出せる形で
C++でコンポーネントを作成して

xptcall経由でそのコンポーネントを取得

そこから呼び出す

面倒くさいので、コードで説明する

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```

まず、C++側のコード

```
1 NS_IMETHODIMP↓
2 nsFts3Tokenizer::RegisterTokenizer(mozIStorageConnection *connection)↓
3 {↓
4     nsresult rv;↓
5     nsCOMPtr <mozIStorageStatement> selectStatement;↓
6     ↓
7     rv = connection->CreateStatement(NS_LITERAL_CSTRING(↓
8         "SELECT fts3_tokenizer(?1, ?2)",↓
9         getter_AddRefs(selectStatement));↓
10    NS_ENSURE_SUCCESS(rv, rv);↓
11    ↓
12    const sqlite3_tokenizer_module* module = nullptr;↓
13    sqlite3Fts3PorterTokenizerModule(&module);↓
14    if (!module)↓
15        return NS_ERROR_FAILURE;↓
16    ↓
```

呼びたいのはこれだけ


```
41 interface mozIStorageConnection;↓
42 ↓
43 [scriptable, uuid(136c88ea-7003-4fe8-8835-333fd18e598c)]↓
44 interface nsIFts3Tokenizer : nsISupports {↓
45     // register FTS3 tokenizer module for "mozporter" tokenizer↓
46     // mozporter is based by porter tokenizer with bi-gram tokeniz
47     void registerTokenizer(in mozIStorageConnection connection);↓
48 };↓
```

IDLファイル

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 */

42 #define NS_FTS3TOKENIZER_CONTRACTID \
43     "@mozilla.org/messenger/fts3tokenizer;1"
44 #define NS_FTS3TOKENIZER_CID \
45     { /* a67d724d-0015-4e2e-8cad-b84775330924 */ \
46     0xa67d724d, 0x0015, 0x4e2e, \
47     { 0x8c, 0xad, 0xb8, 0x47, 0x75, 0x33, 0x09, 0x24 }}
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コンポーネント自体を作成する
仕組みも
作らなければ

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 *
 * // Register custom tokenizer to index all language text↓
 * var tokenizer = Cc["@mozilla.org/messenger/fts3tokenizer;1"].↓
 *   getService(Ci.nsIFts3Tokenizer);↓
 * tokenizer.registerTokenizer(dbConnection);↓
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このように
C++とJavaScriptの両方を
書く必要がある

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呼びたい関数が増えれば、
IDLファイルの変更が必要になる

Gecko的には、
IDLを変更した場合には
そのinterfaceの
UUIDを変えないといけない

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41 interface mozIStorageConnection;
42
43 [scriptable, uuid(136c88ea-7003-4fe8-8835-333fd18e598c)]
44 interface nsIFts3Tokenizer : nsISupports {
45     // register FTS3 tokenizer module for "mozporter" tokenizer
46     // mozporter is based by porter tokenizer with bi-gram tokeniz
47     void registerTokenizer(in mozIStorageConnection connection);
48 }
```

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C++で書かないといけないということは

Mac OS XとWindowsの
両方に対応する
Extensionを書く場合は

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ということは、

Windowsしかもっていない場合は、
Macを買わないといけないうってことか！

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Mac OS Xって
PowerPCとかx86とかx86_64もあるよね？

各CPU種類ごとにも
ビルドする必要があるってこと？

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そんな感じで

各OS、CPU毎のバイナリを
Extensionに入れば

どのプラットフォームでもサポート可能

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そんなことしてる例が、

Mozilla LabにWeave Syncというものが
あってだな

Weave SyncのExtensionをバラしてみる

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```

340c2bbc-ce74-4362-90b5-7c26312808ef/platform 🔍 100%



Darwin



Linux



Linux_x86-gcc3



Linux_x86_64-gcc3



SunOS



WINCE



WINNT_x86-msvc

```
22:04:00 [P6z9wv0 Be:
./WINNT_x86-msvc
./WINNT_x86-msvc/components
./WINNT_x86-msvc/components/WeaveCrypto.dll
./WINCE
./WINCE/components
./WINCE/components/WeaveCrypto.dll
./SunOS
./SunOS/components
./SunOS/components/WeaveCrypto.so
./Linux_x86_64-gcc3
./Linux_x86_64-gcc3/components
./Linux_x86_64-gcc3/components/WeaveCrypto.so
./Darwin
./Darwin/components
./Darwin/components/WeaveCrypto.dylib
./Linux_x86-gcc3
./Linux_x86-gcc3/components
./Linux_x86-gcc3/components/WeaveCrypto.so
./Linux
./Linux/components
./Linux/components/WeaveCrypto.so
```

ちょっと共有ライブラリを
使いたいただけでも

いちいちC++で

コードを書かないといけないのが現状


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ということは

メンドクサイ

ちよっとやることを大げさになると
アドオンの開発が
JavaScriptで閉じなくなるのは面倒

これはMozillaっぽくない

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なら、簡単に呼び出せる方法を
作ればよくない？

そこでjs-ctypes

js-ctypes

- ネイティブコード(共有ライブラリ)を呼び出す新しい方法
- Firefox 3.6 (Gecko 1.9.2)から利用可能
- 名前の由来は、Pythonのモジュールから

js-ctypes

- 簡単なライブラリを呼び出すだけであれば、いちいち専用コンポーネントを作成する必要があった
 - 制限事項に引っかからない限りこれからは必要なし
- Chrome権限が必要なので、HTMLコンテンツからは使えません

js-ctypes

- Mike Finkle (今モバイルやってる人) がはじめたプロジェクト
- 最初はExtensionとしての実装
- 今は、Raw JSAPI経由
- JavaScriptとネイティブコードのバインディングには、libffiを利用

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```

使い方

呼び出し方法は簡単

```
1 Components.utils.import(↓
2   "resource://gre/modules ctypes.jsm");↓
3 ↓
4 var lib = ctypes.open("user32.dll");↓
5 ↓
6 var testfunc = lib.declare("test",↓
7   ctypes.default_abi /* caller type */,↓
8   ctypes.void_t /* return type */,↓
9   ctypes.int8_t /* 1st param */);↓
10 ↓
11 testfunc(1);↓
12 ↓
13 lib.close();↓
```

まず、 ctypes.jsm をインポートして


```
1 Components.utils.import(↓
2   "resource://gre/modules ctypes.jsm");↓
3 ↓
4 var lib = ctypes.open("user32.dll");↓
5 ↓
6 var testfunc = lib.declare("test",↓
7   ctypes.default_abi /* caller type */,↓
8   ctypes.void_t /* return type */,↓
9   ctypes.int8_t /* 1st param */);↓
10 ↓
11 testfunc(1);↓
12 ↓
13 lib.close();↓
```

呼びたいライブラリをロードして

```
1 Components.utils.import(↓
2   "resource://gre/modules ctypes.jsm");↓
3 ↓
4 var lib = ctypes.open("user32.dll");↓
5 ↓
6 var testfunc = lib.declare("test",↓
7   ctypes.default_abi /* caller type */,↓
8   ctypes.void_t /* return type */,↓
9   ctypes.int8_t /* 1st param */);↓
10 ↓
11 testfunc(1);↓
12 ↓
13 lib.close();↓
```

関数を定義して

```
1 Components.utils.import(↓
2   "resource://gre/modules ctypes.jsm");↓
3 ↓
4 var lib = ctypes.open("user32.dll");↓
5 ↓
6 var testfunc = lib.declare("test",↓
7   ctypes.default_abi /* caller type */,↓
8   ctypes.void_t /* return type */,↓
9   ctypes.int8_t /* 1st param */);↓
10 ↓
11 testfunc(1);↓
12 ↓
13 lib.close();↓
```

定義した関数を呼び出す

```
1 Components.utils.import(↓
2   "resource://gre/modules ctypes.jsm");↓
3 ↓
4 var lib = ctypes.open("user32.dll");↓
5 ↓
6 var testfunc = lib.declare("test",↓
7   ctypes.default_abi /* caller type */,↓
8   ctypes.void_t /* return type */,↓
9   ctypes.int8_t /* 1st param */);↓
10 ↓
11 testfunc(1);↓
12 ↓
13 lib.close();↓
```

いらなくなったら、クローズ

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```

シンプル!

関数定義でサポートされている型

- void
- 整数 (int8 ~ int64)
- 浮動小数点 (float、double)
- 文字列 (ASCIIとUnicode)

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xptcall vs js-ctypes

は内部的にはどう違うの

xptcall

- Geckoでは内部でxptcallと呼ばれる機能があつて、そこでJavaScriptとネイティブコードのバインディングが行われる
 - 各プラットフォーム毎に実装が必要
- xptcallからxpconnect経由でネイティブコードを呼び出す
- xptcallを利用するには、IDLが必要

js-ctypes

- js-ctypesがJavaScriptエンジンのAPIを直接呼び出す
- 言語間バインディングはlibffiまかせ
- エクスポートされているものは呼び出し可能

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同じようなことできるけど、
内部的には
まったくやってること違うんですよ

ただ、悲しいお知らせもあります

現在の制限事項

- コールバック関数をパラメータとして渡すことができない
- 構造体を利用することができない
- 参照も
- ARM環境(MaemoとかWindows Mobileとか)は現在未サポート

Reference

- Mike's blog (about js-ctypes implementation)
<http://starkravingfinkle.org/blog/2007/09/hello-js-ctypes-goodbye-binary-components/>
- ctypes.jsm
https://developer.mozilla.org/en/JavaScript_code_modules/ctypes.jsm

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