



Information, Can You Get It Fast Enough?

Empress Fast Search Functionality

Empress Software Inc.

Agenda

- Introduction
- Empress API Speed
- Retrieval Speed – Using Indexes

Agenda

- Shiborikomi Search Capability
- Text Search Index Capability
- Instead of Conclusion

Introduction

- How Important is Data Retrieval Speed?

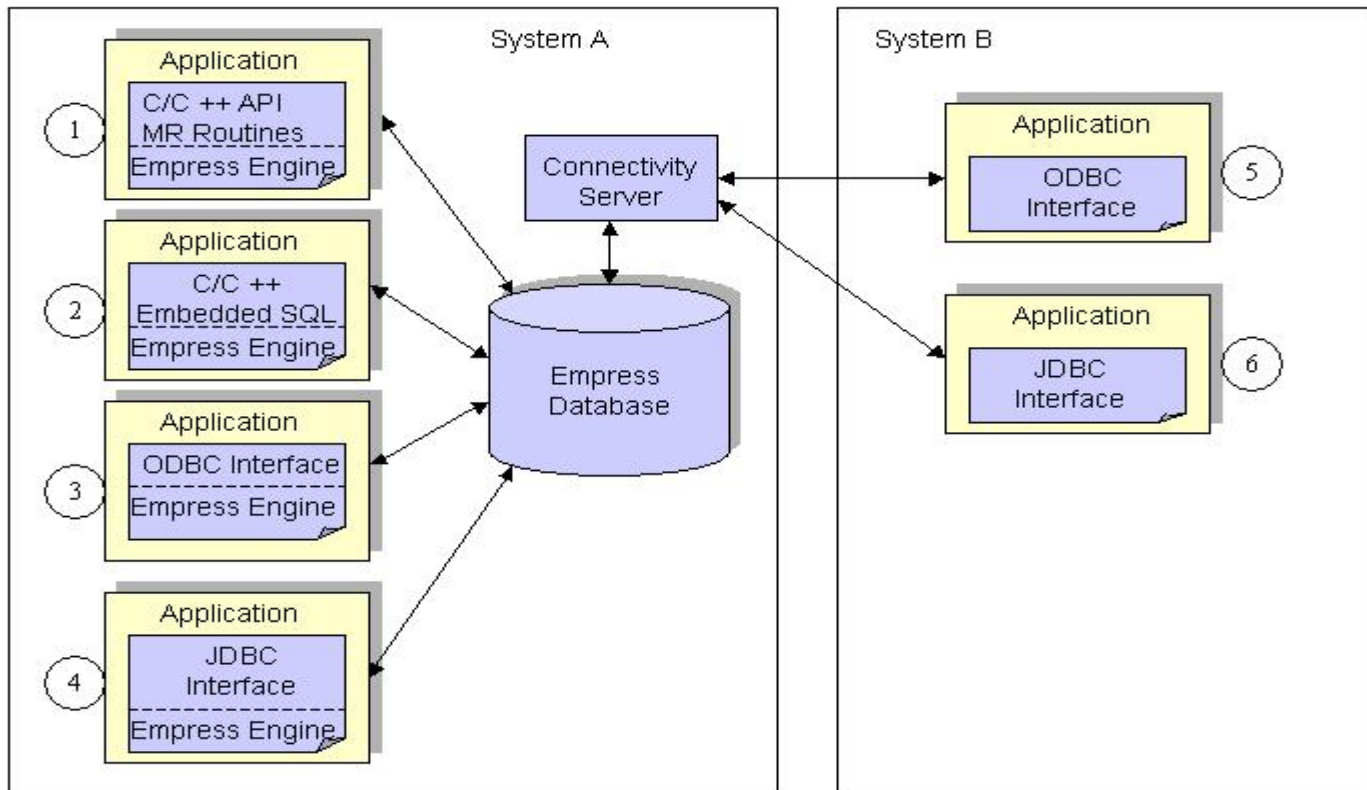
Empress API's

Languages: C, C++, Java, ...

Code Sets: Latin-1, Unicode, UTF-8, EUC-JP, SJIS, ...

- C/C++ Kernel Level Interface - mr Routines
- Embedded Static and Dynamic SQL
- *ODBC Interface*
- *JDBC Interface*

Empress API's



Performance Considerations

Benchmark Scenario for Embedded Printer Database

- dbCreateSchema - create database printer_db
- registerPrinterJobs - insert 256 printer jobs
- registerPrinterInfo - insert 256 printer info items
- setPrinterJob - update job id: 134
- getPrinterJob - retrieve printer job info for job 134
- deletePrinterJob – delete printer job 134
- getPrinterInfo - retrieve printer info for job 134
- deletePrinterInfo – delete printer info for job id 134

Performance Considerations

Benchmark Scenario for Embedded Printer Database

- Benchmark performed on the target Intel x86 Celeron 800MHz PC system

API Calls	ULTRA	
	Execution Time (ms)	Dynamic Memory Usage (bytes)
RegisterPrinterJob	11.235	2,236
RegisterPrinterInfo	7.743	2,248
SetPrinterJob	0.316	0
GetPrinterJob	0.132	780
DeletePrinterJob	0.205	0
GetPrinterInfo	0.141	88
DeletePrinterInfo	1.255	0

Empress Special Searches

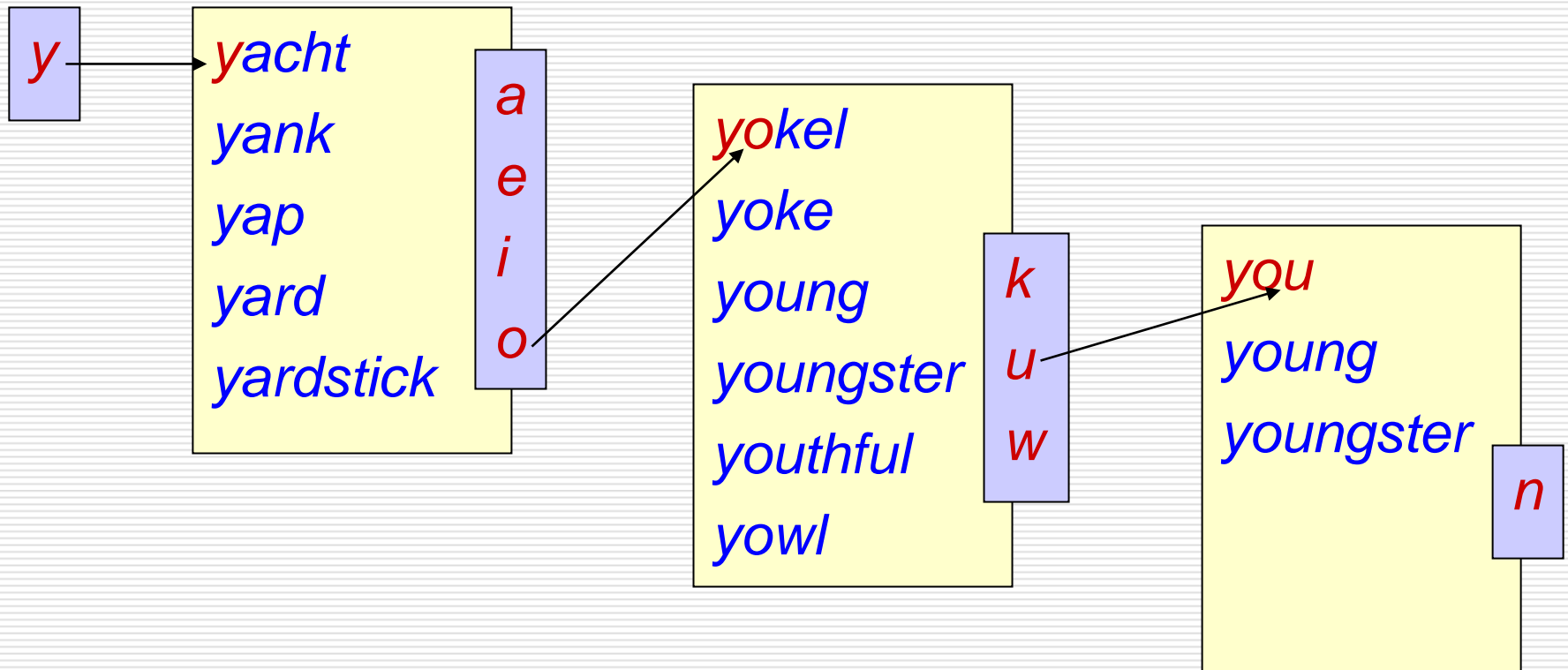
- *Shiborikomi Search*
- *Spatial Index Search*
- *Text Search Index*

Empress Shiborikomi Search

- *Additional set of C API calls that should be used in conjunction with Empress C/C++ Kernel Level API – mr Routines.*
- *For Car Navigation, Car Infotainment and Mobile Application Market*
- *Searches a Single Table and a Single Attribute of a Character Based Empress Data Type.*

Empress Shiborikomi Search

Car Navi & Cell Phone Applications



Empress Shiborikomi Search

Shiborikomi Search API Calls

- `ms_shiborikomi_search_begin()`
- `ms_shiborikomi_search_end()`
- `ms_shiborikomi_search()`
- `ms_shiborikomi_search_next()`
- `ms_shiborikomi_search_prev()`

Empress Shiborikomi Search

Shiborikomi Search Example Excerpt

```
handle = ms_shiborikomi_search_begin (rec, attr, *argv[4], &count);

if (ptrnil (handle))
    goto done;

printf ("Count=%d\n", count);
for (i = 0; i < count; i++)
{
    if (ms_shiborikomi_search (handle, i + 1) == 1)
    {
        printf ("Record Number=%d\t", mrgetptr (rec));
        printf ("Attr: %s\n", mrgetvs (rec, attr));
    }
    else
        printf ("Error: %s\n", mrerrmsg ());
}
```

Empress Text Search Index

- *Implements an efficient search for database records using keywords/tokens/phrases.*
- *Additional set of C calls that are used in conjunction with Empress C/C++ Kernel Level API – mr Routines.*
- *Application would supply the list (array) of tokens/keywords/phrases on insertion in the Empress database in order to create a text search index.*

Empress Text Search Index

Karaoke Machine

- *For the famous Beatles song “**I Want To Hold Your Hand**” the list of tokens/keywords/phrases could look like as follows:*

Want

Hold

Hand

I

Hold Your

Your Hand

Hold Your Hand

Empress Text Search Index

Karaoke Machine

- Search using either token *Mc* or *Mac* to get a song title "*Old Macdonald*".
- Search using token *Hold* to get a song title "*I Want To Hold Your Hand*", the result list may include:

You Really Got A Hold on Me (Beatles)

If We Hold On (Diana Ross)

I Want To Hold Your Hand (Beatles)

Hold Me Back (Ac/Dc)

Hold Me, Thrill Me, Kill Me (U2)

Empress Text Search Index

Karaoke Machine

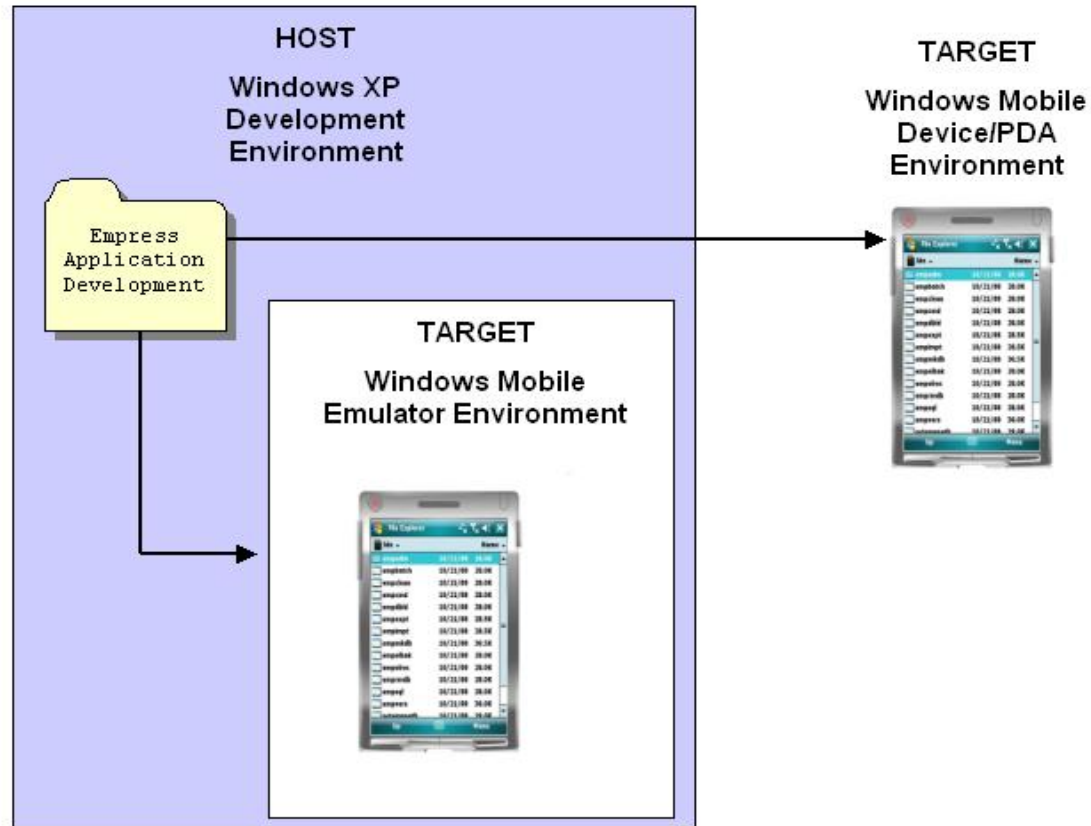
Hold

You Really Got A Hold on Me
If We Hold On
I Want To Hold Your Hand
Hold Me Back
Hold Me, Thrill Me, Kill Me

I Want To Hold Your Hand

Text Search App Development

Developing with Empress



Empress Text Search App Development

Installing Empress Cross Development Package

```
C:\Empress\wm6-dev\  
|--> Getting_Started.doc      Special Windows Mobile 6 instructions  
|--> rdbms                    Empress RDBMS binaries  
|--> docs                     Empress documentation  
|--> samples                  Sample programs  
|--> tsi-arm                  Text Search Index components  
    |--> tsi_api.hx           Text Search include file  
    |--> tsi_search.obj       Text Search Index API library  
|--> xtarget  
    |--> wm6-arm              Empress files for PowerPC target  
        |--> bin\              Empress include files  
        |--> include\          Empress include files  
        |--> rdbms\            Empress loadable libraries  
        |--> nls\              Empress config files (for reference)  
        |--> shlib\            Version of this target package
```

Empress Text Search Index

Text Search API Calls

- `mstsi_create ()`
- `mstsi_drop ()`
- `mstsi_open ()`
- `mstsi_close ()`
- `mstsi_add ()`
- `mstsi_del ()`
- `mstsi_get ()`
- `mstsi_getv ()`
- `mstsi_union_reclist ()`
- `mstsi_intersect_reclist ()`

Empress Text Search Index

Text Search Example Excerpt

```
songs_tabdesc = mropen (DATABASE, L"songs", 'r');

songs_recdesc = mrmkrec (songs_tabdesc);
id_attrdesc = mrngeta (songs_tabdesc, L"id");
title_attrdesc = mrngeta (songs_tabdesc, L"title");

index_handle= mstsi_open (songs_tabdesc , title_attrdesc, 'r');

id_value = mrspv (id_attrdesc);
title_value = mrspv (title_attrdesc);

record_list = mstsi_get (index_handle, L"Hold", 0);
if (record_list == 0)
{
    printf ("No songs with token Hold\n");
    return 0;
}
qual = mrqlst (songs_tabdesc, record_list);

retrieve_desc = mrgetbegin (qual, songs_recdesc, (void*) 0);

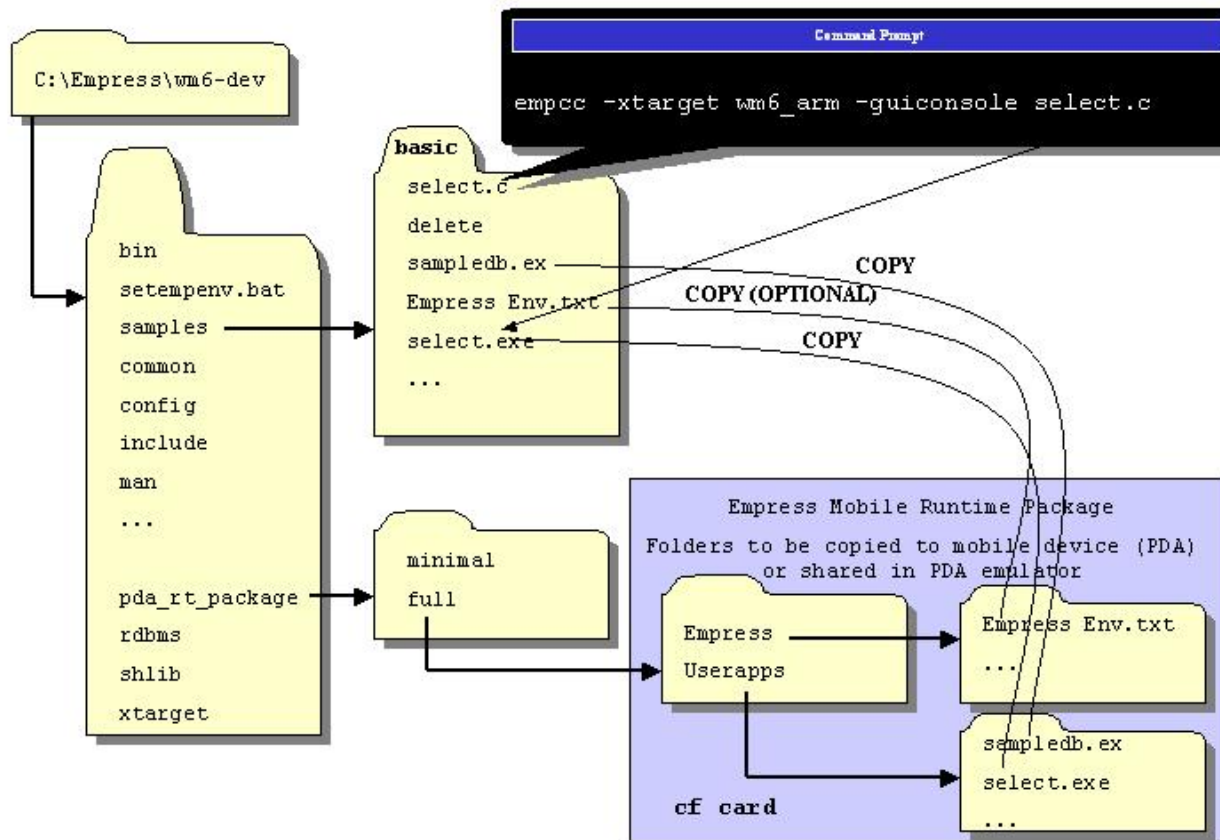
while (mrget (retrieve_desc))
```

Empress Text Search Index

Cross-compiling Application with Text Search Capability

```
empcc -xtarget wm6-arm  
-guiconsole  
-I C:\Empress\wm6-dev\tsi-arm  
application.c  
C:\Empress\wm6-dev\tsi_arm\tsi_search.obj
```

Empress Text Search App Development

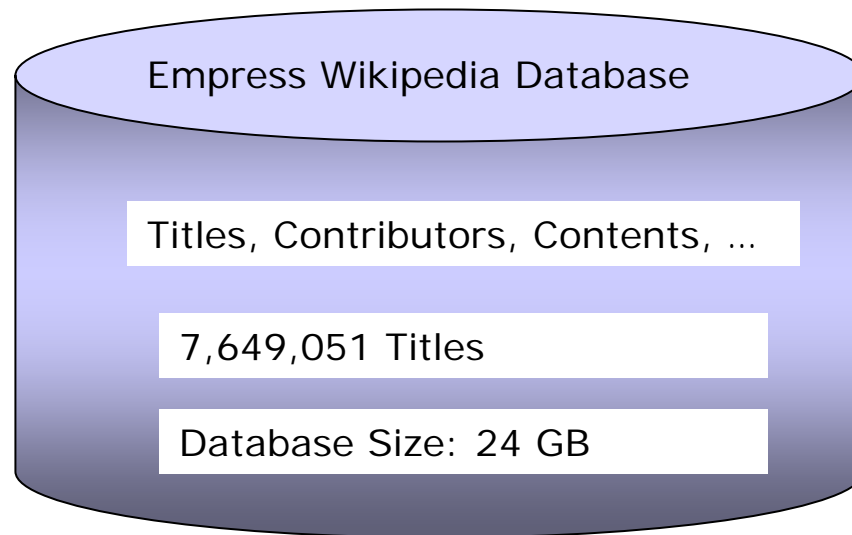


Empress Text Search Index

Wikipedia "The Free Encyclopedia" Database

Windows Mobile 6 Device – HP iPAQ

CPU: PXA310 624MHz, 128MB, CF Card: 32GB



Empress Text Search Index

Wikipedia Database

- *Search Wikipedia DB for titles having **Embedded** keyword:*

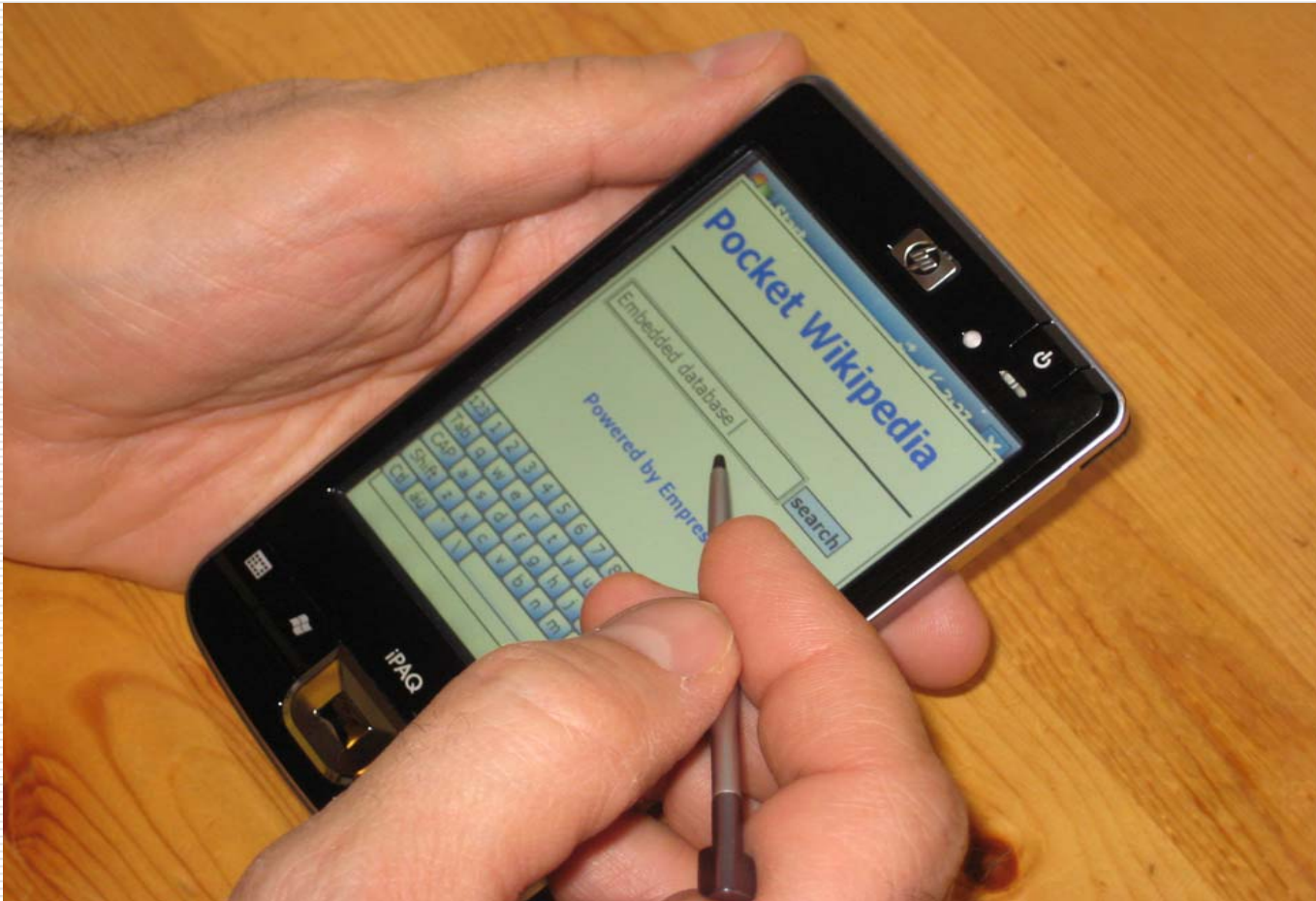
SELECT id, title FROM pages WHERE title LIKE '%Embedded%'

- *Without Empress Text Search Index:
35.314 seconds with 131 **titles** in the result set.*
- *With Empress Text Search Index:
0.077 seconds with 131 **titles** in the result set.*

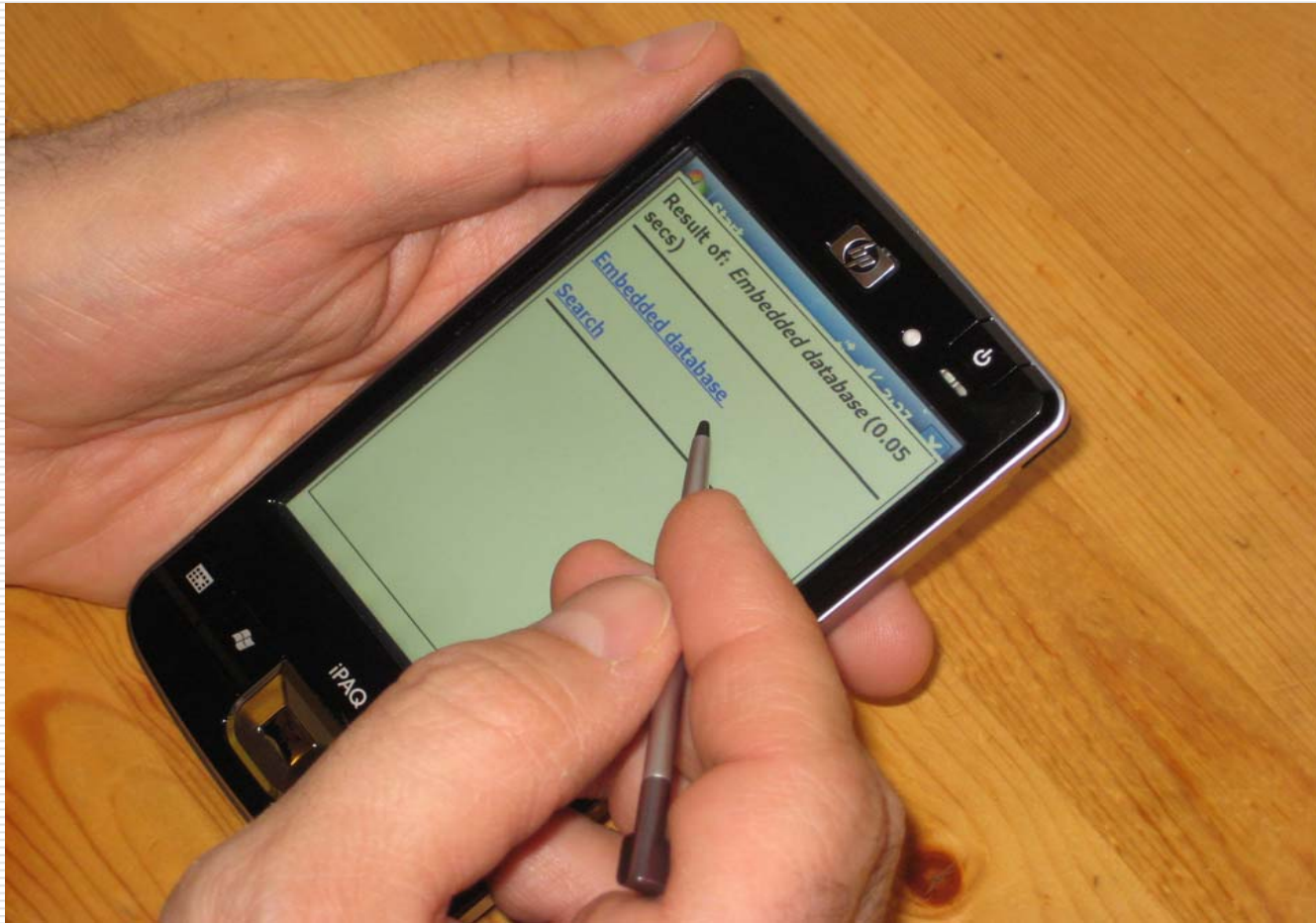
Empress Text Search App Development



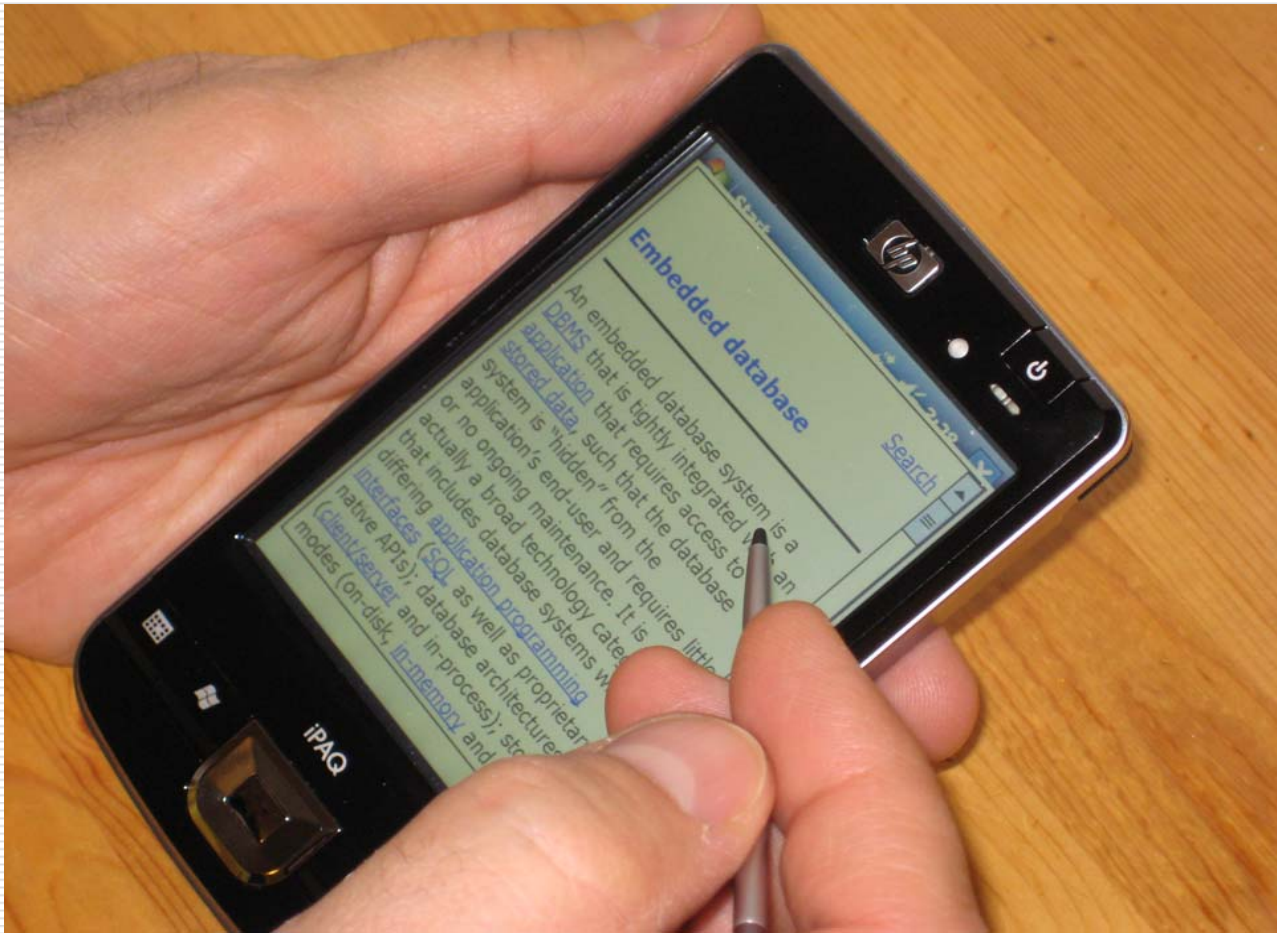
Empress Text Search App Development



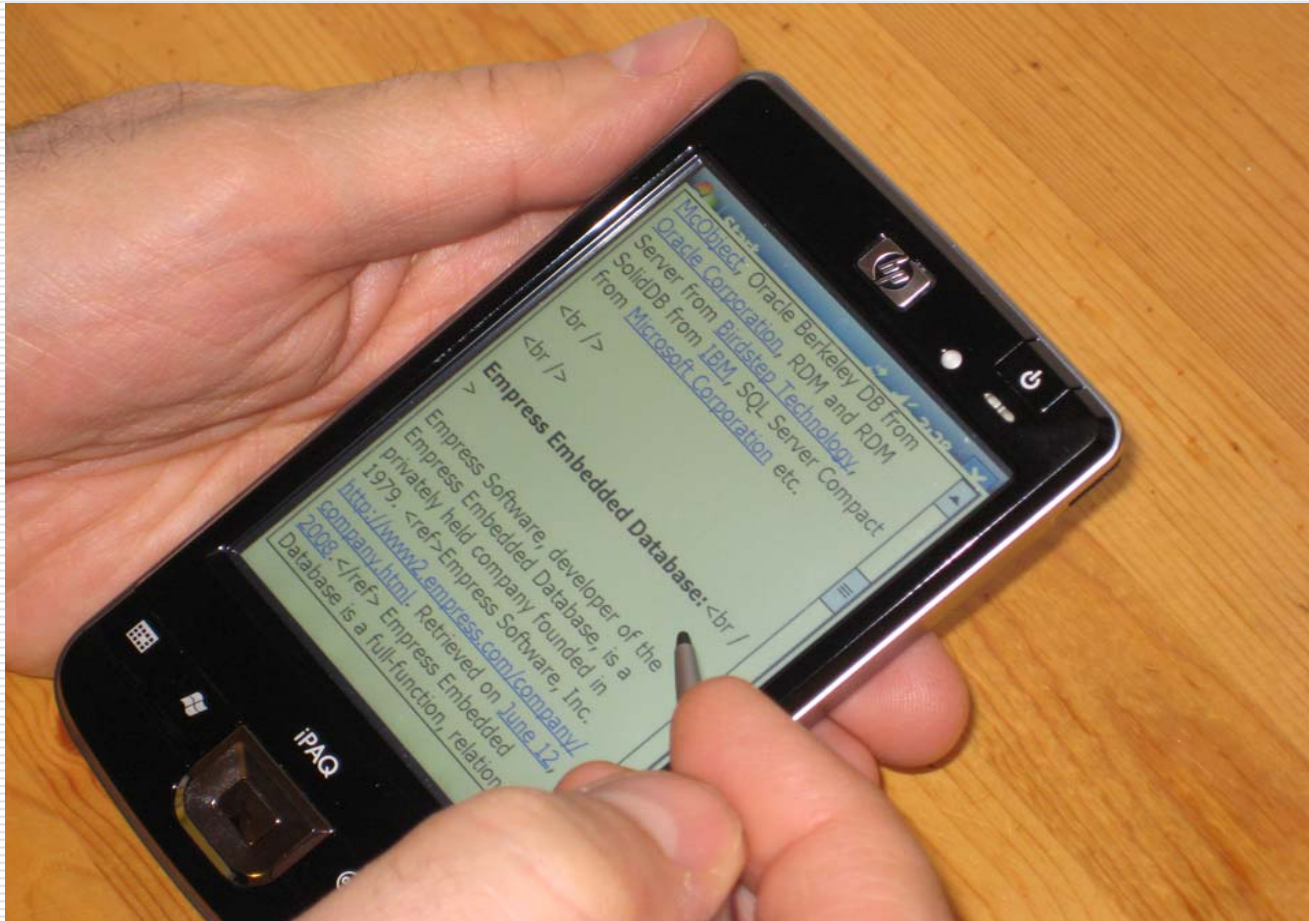
Empress Text Search App Development



Empress Text Search App Development



Empress Text Search App Development



How Does It Work?

- An Example in Windows Mobile Emulator
- Show Wikipedia Demo
- Compare to Wikipedia Search on Web

Instead of Conclusion

- ***Empress*** brings new **retrieval** features to address the growing needs of embedded systems.

Instead of Conclusion

- ***Empress*** is the perfect fit for those embedded systems that require handling **vast amount** of information and require retrieving it **fast**.

Contact Information

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