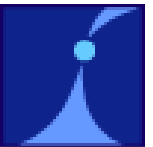


WvStreams

An Easier Way to World Domination

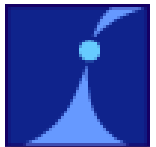
Dave Coombs – Crazy Person
dcoombs@nit.ca

Chemnitzer Linux-Tag 2004



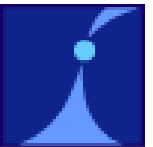
Achtung!!

- Mein Deutsch ist schrecklich.
- The map out there is too small!



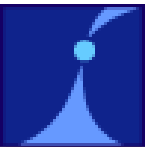
Outline

- Important notes
- What is WvStreams?
- How can we help you?
- Craziness
- ???
- Triumph



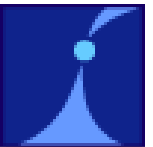
Heckling Policy

- If I say something stupid, tell me.
 - I can take a lot of abuse.



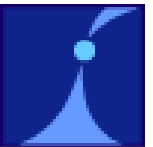
Speed

- Fact: I am hyper.
- Please tell me to slow down.
 - Use force if necessary.




Pronunciation Note

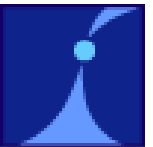
- “Wv-” is pronounced “Weave”
- Not “Wuv”
- Not “Wev”
- **Definitely** not “Double-you-vee”!
- Try it:
 - WvStreams == WeaveStreams
 - WvDial == WeaveDial



Spelling Note

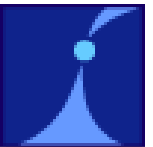
- What is "vw dial"?
 - You silly Germans!

WvStreams !=  Streams

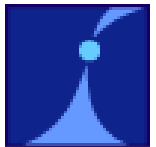


What is WvStreams

- Nominally, C++ networking library
- Does lots more, too
 - Coders always screw up certain things
 - Do the hard stuff only once
- **Pragmatic**

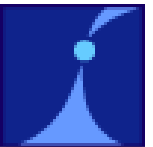


Sometimes We Do Things Wrong



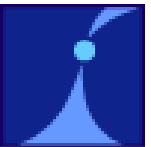
More Things We Do Wrong

- ...all the time!
 - File I/O -- (especially text files)
 - String manipulation, buffers
 - Lists and tables
 - Networking
 - Configuration
 - Multitasking
- WvStreams is very good at these



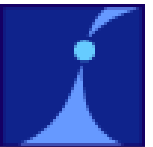
Justifiable Ugliness: Proof That It Works

- Easy to write **stuff fast**
 - Tunnel Vision VPN (one weekend)
 - Retchmail (one evening)
- Easy to write **fast stuff**
 - WvTFTP (3.5 times faster)
 - Retchmail (ha!)
- Useful stuff
 - WvDial



Basic Principles

- A `WvStream` can be:
 - read from and written to, **or**
 - selected, given a callback when ready
- Everything is a `WvStream`
- `WvStreamList` is magic

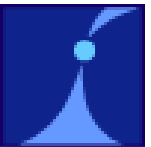


WvStreamList is Magic

```
WvTimeStream ts();
ts.set_timer(5000);      // every 5 seconds
ts.setcallback(do_something, NULL);
WvFancyStream f;        // its execute() does something
WvDancyStream *d = some_pointer;

WvStreamList list;
list.append(&ts, false);
list.append(&f, false);
list.append(d, true);   // auto-free

while (f.isok() && !want_to_die) {
    if (list.select(-1))
        list.callback();
}
```



How Can We Help You?

- Ever wanted these?

TCP/IP

Compression

Configuration System

HTTP downloading

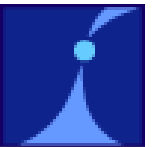
Record/playback audio

Crypto

IPC

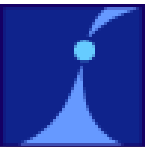
Portability

Multitasking



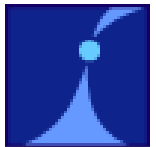
The Old-Fashioned Way

- Traditionally, those can be painful:



The Old-Fashioned Way

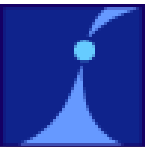
- And then, later:



Trivial TCP/IP

```
WvTCPConn *conn = new WvTCPConn("www.yahoo.com", 80);  
conn->noread();  
conn->print("Chickens have feathers!\n");  
conn->nowrite();  
WvIStreamList::globallist.append(conn, true);
```

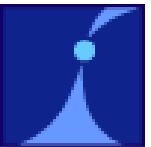
- Really, really short
- Cleans up after itself
 - Auto-free is convenient



Crazy Cryptography

```
WvTCPConn *conn = new WvTCPConn("www.yahoo.com", 80);  
WvBlowfishStream *fish = new WvBlowfishStream(conn,  
                                               "secretkey", 9);  
fish->noread();  
fish->print("Chickens have feathers!\n");  
fish->nowrite();  
WvIStreamList::globallist.append(fish, true);
```

- One difference: wrapper stream
- Auto-free cleans up both streams
- What about fish->getline() ?

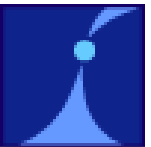


Compelling Compression

- Look, I implemented **zcat** in 4 lines!

```
WvFile *f = new WvFile("whatever.gz", O_RDONLY);  
WvGzipStream *gz = new WvGzipStream(f);  
gz->autoforward(*wvcon);  
WvIStream::globallist.append(gz, true);
```

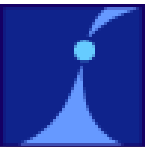
- Now you can encrypt and compress your network app's protocol.



Instant IPC

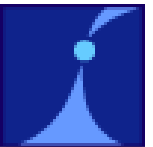
- Want fast, safe, easy to use
 - Sockets? Named pipes? Shared memory?

```
WvMagicCircle q(1024);
if (fork() > 0) {
    // parent
    q.put("some stuff", 10);
    ...
} else {
    // child
    while(1) {
        char buf[1024];
        q.get(buf, 1024);
        printf("%s\n", buf);
    }
}
```



Cunning Configuration

- Most config systems suck
 - Bad API, ugly file formats, no notifications, bad caching
- UniConf
 - Pluggable back **and** front ends
 - Notifications
 - Simple API
- <http://open.nit.ca/uniconf.pdf>
 - Or talk to Avery today!

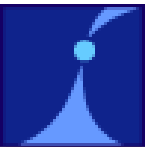


Cunning Configuration

- Simple API:

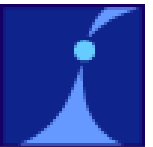
```
// do this once
UniConfRoot root("registry:localhost");
UniConf cfg( root
    [ "HKEY_CURRENT_USER/Software/Net
      Integration/ExchangeIt" ] );

// but only this each time
string buf = cfg["Host"].get();
```



Painless Portability

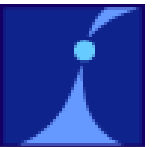
- `main()` usually has a `WvStreamList` select loop
- Wrapper libraries for:
 - Qt
 - Gtk
 - Win32. Yes.
- Convenience of `WvStreams` in other event-driven models



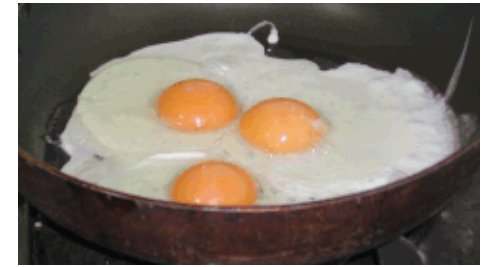
Unbelievable UrlPool

- Need to grab a file with HTTP or FTP?
- WvUrlPool
 - "Fast, easy, parallelizing, pipelining HTTP/1.1 and FTP file retriever"

```
WvUrlPool *pool = new WvUrlPool();  
WvStream *s1, *s2, *s3;  
s1 = pool->addurl("http://somewhere.com/somefile");  
s2 = pool->addurl("http://elsewhere.org/picture.jpg");  
s3 = pool->addurl("ftp://ftp.moo.com/cowsong.mp3");  
mystreamlist.append(pool, true);
```



Oggs Over-easy

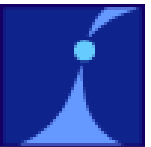


- Ogg Speex and Vorbis WvEncoders

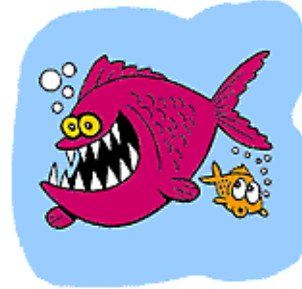
```
WvFile *outfile = new WvFile(/*filename*/);

WvEncoderStream *enc = new WvEncoderStream(outfile);
enc->auto_flush(false);
WvOggVorbisEncoder *oggenc = new WvOggVorbisEncoder(
    WvOggVorbisEncoder::VBRQuality(1.0), SND_RATE, 1);
enc->writechain.append(
    new WvPCMSigned16ToNormFloatEncoder(), true);
enc->writechain.append(oggenc, true);
```

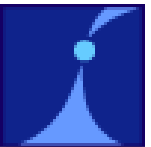
- Write PCM data to 'enc', and it makes a Vorbis-encoded file



Multitasking Mayhem

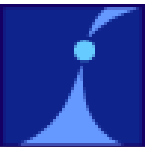


- Juggling piranhas
- WvCont
 - totally crazy -- continuations
 - wrapper for arbitrary callback function
 - uses `setjmp()` and `longjmp()`
 - no nasty preemption, races, mutexes, etc.
- Best illustrated with an example
 - (Ooh, foreshadowing!)



Demos

- Hilarity ensues

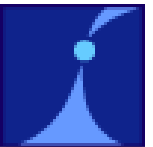


Links

Dave Coombs <dcoombs@nit.ca>

<http://open.nit.ca/wiki/?WvStreams>

<http://people.nit.ca/~dcoombs/clt2004/>



Any Questions?

Dave Coombs <dcoombs@nit.ca>

<http://open.nit.ca/wiki/?WvStreams>

<http://people.nit.ca/~dcoombs/clt2004/>

