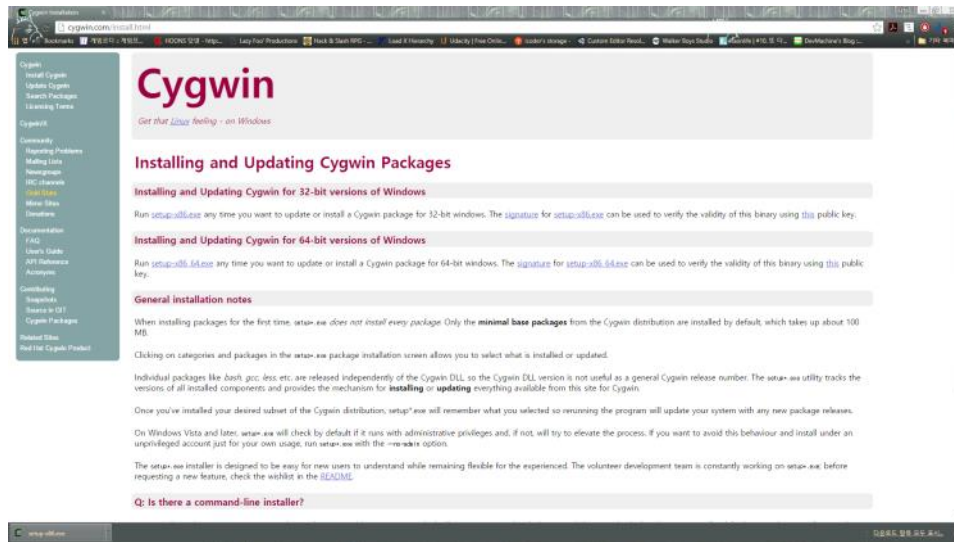


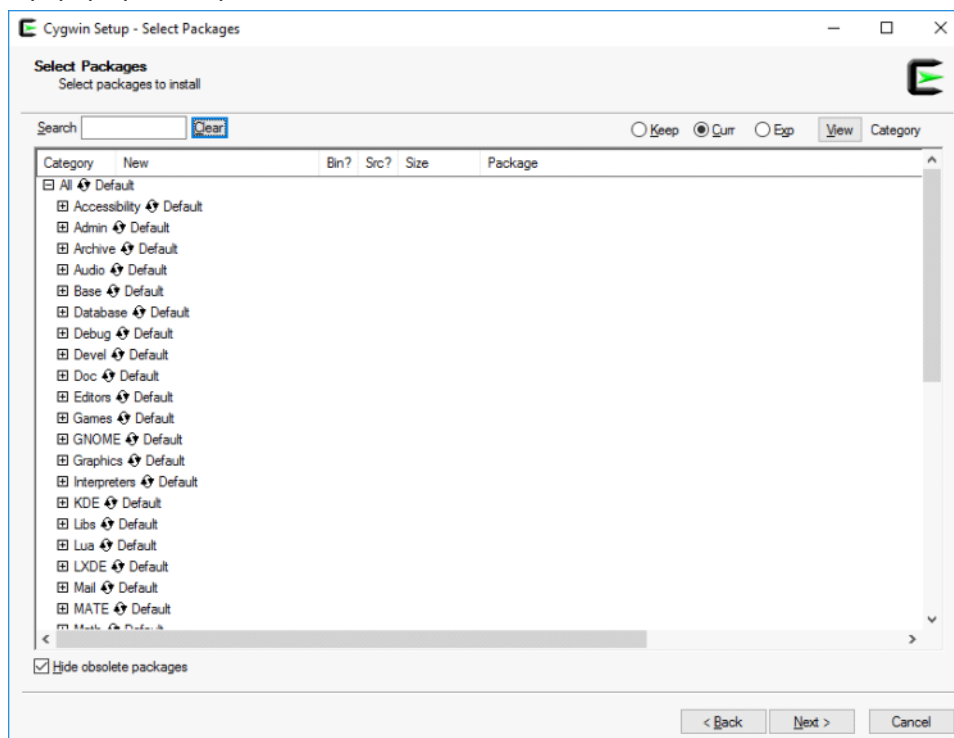
OS 개발 환경 구축

2016년 1월 11일 월요일 오전 2:34

1. Cygwin 설치 : 32비트 버전으로 설치



2. 패키지 파일 설치



+Devel

binutils - 2.25-2, 바이너리만 설치

bison - 3.0.4-1, 바이너리만 설치

flex - 2.5.39-1, 바이너리만 설치

gcc-core - 4.9.2-3, 소스 및 바이너리 설치

gcc-g++ - 4.9.2-3, 바이너리만 설치

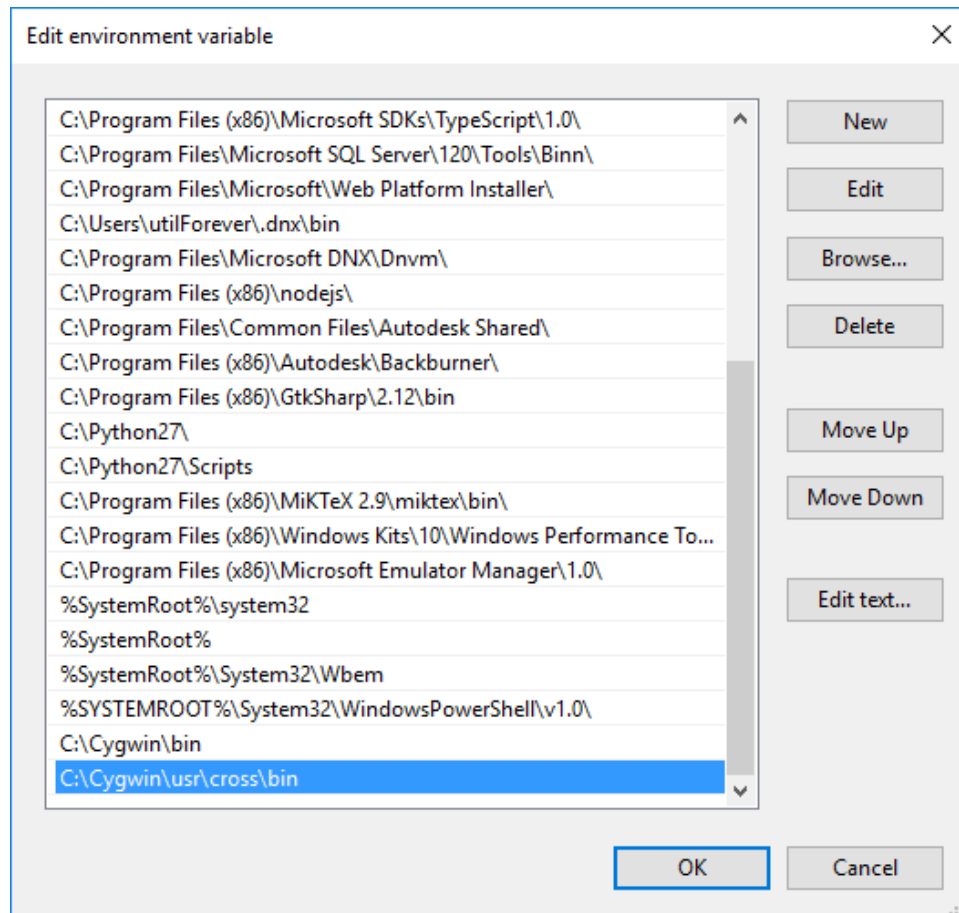
libtool - 2.4.6-1, 바이너리만 설치

make - 4.1-1, 바이너리만 설치
patchutils - 0.3.3-1, 바이너리만 설치
texinfo - 5.2-3, 바이너리만 설치

+Libs

libiconv-devel - 1.14-3, 바이너리만 설치
libintl-devel - 0.19.4-1, 바이너리만 설치
libgmp-devel - 6.1.02p-1, 바이너리만 설치
libmpfr-devel - 3.1.2-2, 바이너리만 설치
libmpc-devel - 1.0.3-1, 바이너리만 설치
libncurses-devel - 5.9-20150530-1, 바이너리만 설치

3. 실행 경로 추가



C:\Cygwin\bin
C:\Cygwin\usr\cross\bin

4. GCC 설치 확인 및 테스트

- test.c
#include <stdio.h>

```
int main( int argc, char** argv )  
{  
    printf( "Hello, world\n" );  
    return 0;  
}
```

- gcc -m32 -o test32 test.c
gcc -m64 -o test64 test.c

```
~
Copying skeleton files.
These files are for the users to personalise their cygwin experience.
They will never be overwritten nor automatically updated.

'./bashrc' -> '/home/utilForever//.bashrc'
'./bash_profile' -> '/home/utilForever//.bash_profile'
'./inputrc' -> '/home/utilForever//.inputrc'
'./profile' -> '/home/utilForever//.profile'

utilForever@DESKTOP-2E5J5K8 ~
$ gcc -m32 -o test32 test.c

utilForever@DESKTOP-2E5J5K8 ~
$ gcc -m64 -o test64 test.c
test.c:1:0: sorry, unimplemented: 64-bit mode not compiled in
#include <stdio.h>
^

utilForever@DESKTOP-2E5J5K8 ~
$ |
```

5. GNU Binutils 생성하기 (여기서부터 Cygwin을 관리자 권한으로 실행할 것!)

- binutils 소스를 <http://ftp.gnu.org/gnu/binutils/> 에서 다운로드 (binutils-2.25.1.tar.bz2)
- 다운로드한 파일을 C:\cygwin\usr\src로 복사
- 압축 풀기 : tar -xvf binutils-2.25.1.tar.bz2
- 플랫폼 및 경로 설정
 - o export TARGET=x86_64-pc-linux
 - o export PREFIX=/usr/cross
- 플랫폼 디렉터리, 64비트 지원과 관련된 빌드 옵션 설정
 - o ./configure --target=\$TARGET --prefix=\$PREFIX --enable-64-bit-bfd --disable-shared --disable-nls

```
/usr/src/binutils-2.25.1
checking where to find the target as... just compiled
checking where to find the target cc... pre-installed
checking where to find the target c++... pre-installed
checking where to find the target c++ for libstdc++... pre-installed
checking where to find the target dlltool... just compiled
checking where to find the target gcc... pre-installed
checking where to find the target gcj... pre-installed
checking where to find the target gfortran... pre-installed
checking where to find the target gccgo... pre-installed
checking where to find the target ld... just compiled
checking where to find the target lipo... pre-installed
checking where to find the target nm... just compiled
checking where to find the target objdump... just compiled
checking where to find the target ranlib... just compiled
checking where to find the target readelf... just compiled
checking where to find the target strip... just compiled
checking where to find the target windres... just compiled
checking where to find the target windmc... just compiled
checking whether to enable maintainer-specific portions of Makefiles... no
configure: creating ./config.status
config.status: creating Makefile

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$ |
```

- 빌드 환경에 대한 정보 수집 : make configure-host

```

/usr/src/binutils-2.25.1
checking for a known getopt prototype in unistd.h... yes
checking whether strstr is declared... yes
checking whether free is declared... yes
checking whether sbrk is declared... yes
checking whether getenv is declared... yes
checking whether environ is declared... yes
checking for library containing zlibVersion... -lz
checking zlib.h usability... yes
checking zlib.h presence... yes
checking for zlib.h... yes
checking whether ANSI C string concatenation works... yes
configure: updating cache ./config.cache
configure: creating ./config.status
config.status: creating Makefile
config.status: creating po/Makefile.in
config.status: creating config.h
config.status: executing depfiles commands
config.status: executing libtool commands
config.status: executing default-1 commands
config.status: creating po/POTFILES
config.status: creating po/Makefile

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$

```

- Binutils 빌드 : make LDFLAGS="-all-static"

```

/usr/src/binutils-2.25.1
ABLE_PLUGINS -DLOCALEDIR="/usr/cross/share/locale/" -W -Wall -Wstrict-prototypes -Wmissing-prototypes -Wshadow -g -O2 -MT eelf_k1om.o -MD -MP -MF .deps/eelf_k1om.Tpo -c -o eelf_k1om.o eelf_k1om.c
mv -f .deps/eelf_k1om.Tpo .deps/eelf_k1om.Po
/bin/sh ./libtool --tag=CC --mode=link gcc -W -Wall -Wstrict-prototypes -Wmissing-prototypes -Wshadow -g -O2 -static-libstdc++ -static-libgcc -all-static -o ld-new.exe ldgram.o ldlex-wrapper.o lexsup.o ldlang.o mri.o ldctor.o ldmain.o ldwrite.o ldexp.o ldemul.o ldver.o ldmisc.o ldfile.o ldcref.o plugin.o ldbuildid.o eelf_x86_64.o eelf32_x86_64.o eelf_i386.o ei386linux.o eelf_llom.o eelf_k1om.o ../bfd/libbfd.a ../libiberty/libiberty.a -lz
libtool: link: gcc -W -Wall -Wstrict-prototypes -Wmissing-prototypes -Wshadow -g -O2 -static-libstdc++ -static-libgcc -static -o ld-new.exe ldgram.o ldlex-wrapper.o lexsup.o ldlang.o mri.o ldctor.o ldmain.o ldwrite.o ldexp.o ldemul.o ldver.o ldmisc.o ldfile.o ldcref.o plugin.o ldbuildid.o eelf_x86_64.o eelf32_x86_64.o eelf_i386.o ei386linux.o eelf_llom.o eelf_k1om.o ../bfd/libbfd.a ../libiberty/libiberty.a -lz
make[4]: Leaving directory '/usr/src/binutils-2.25.1/ld'
make[3]: Leaving directory '/usr/src/binutils-2.25.1/ld'
make[2]: Leaving directory '/usr/src/binutils-2.25.1/ld'
make[1]: Nothing to be done for 'all-target'.
make[1]: Leaving directory '/usr/src/binutils-2.25.1'

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$

```

- Binutils 설치 : make install

```

/usr/src/binutils-2.25.1
mv -f /usr/cross/lib/gcc -g -O2 -print-multi-os-directory'../libiberty.a' /usr/cross/lib/gcc -g -O2 -print-multi-os-directory'../libiberty.a; \
case "" in \
  /*) thd=;; \
  *) thd=/usr/cross/include;; \
esac; \
/bin/sh ../mkinstalldirs ${thd}; \
for h in ../include/ansidecl.h ../include/demangle.h ../include/dyn-string.h ../include/fibheap.h ../include/floatformat.h ../include/hashtab.h ../include/libiberty.h ../include/objalloc.h ../include/partition.h ../include/safe-ctype.h ../include/sort.h ../include/splay-tree.h ../include/timeval-utils.h; do \
  /usr/bin/install -c -m 644 $h ${thd}; \
done; \
fi
make[3]: Entering directory '/usr/src/binutils-2.25.1/libiberty/testsuite'
make[3]: Nothing to be done for 'install'.
make[3]: Leaving directory '/usr/src/binutils-2.25.1/libiberty/testsuite'
make[2]: Leaving directory '/usr/src/binutils-2.25.1/libiberty'
make[1]: Nothing to be done for 'install-target'.
make[1]: Leaving directory '/usr/src/binutils-2.25.1'

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$

```

- Binutils 설치 확인 : /usr/cross/bin/x86_64-pc-linux-ld --help | grep "supported "

```

/usr/src/binutils-2.25.1
done; \
fi
make[3]: Entering directory '/usr/src/binutils-2.25.1/libiberty/testsuite'
make[3]: Nothing to be done for 'install'.
make[3]: Leaving directory '/usr/src/binutils-2.25.1/libiberty/testsuite'
make[2]: Leaving directory '/usr/src/binutils-2.25.1/libiberty'
make[1]: Nothing to be done for 'install-target'.
make[1]: Leaving directory '/usr/src/binutils-2.25.1'

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$ /usr/cross/bin/x86_64-linux-ld --help | grep "supported "
-bash: /usr/cross/bin/x86_64-linux-ld: No such file or directory

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$ /usr/cross/bin/x86_64-pc-linux-ld --help | grep "supported "
/usr/cross/bin/x86_64-pc-linux-ld: supported targets: elf64-x86-64 elf32-i386 elf32-x86-64 a.out-i386-linux pei-i386 pei-x86-64 elf64-l1om elf64-k1om elf64-little elf64-big elf32-little elf32-big plugin srec symbolsrec verilog tekhex binary ihex
/usr/cross/bin/x86_64-pc-linux-ld: supported emulations: elf_x86_64 elf32_x86_64 elf_i386 i386linux elf_l1om elf_k1om

utilForever@DESKTOP-2E5J5K8 /usr/src/binutils-2.25.1
$ |

```

6. GCC 크로스 컴파일하기

- C:\cygwin\usr\src\gcc-4.9.2-3.src에 있는 gcc-4.9.2.tar.bz2 파일을 C:\cygwin\usr\src로 이동
- GCC 소스 파일 압축 해제 : tar -xvf gcc-4.9.2.tar.bz2

```

/usr/src
gcc-4.9.2/libcilkrts/include/cilk/reducer_ostringstream.h
gcc-4.9.2/libcilkrts/include/cilk/reducer_string.h
gcc-4.9.2/libcilkrts/include/cilk/reducer_min.h
gcc-4.9.2/libcilkrts/include/cilk/hyperobject_base.h
gcc-4.9.2/libcilkrts/include/cilk/reducer_file.h
gcc-4.9.2/libcilkrts/include/cilk/reducer_opadd.h
gcc-4.9.2/libcilkrts/include/cilk/holder.h
gcc-4.9.2/libcilkrts/include/cilk/reducer_list.h
gcc-4.9.2/libcilkrts/include/cilk/reducer.h
gcc-4.9.2/libcilkrts/include/cilktools/
gcc-4.9.2/libcilkrts/include/cilktools/cilkview.h
gcc-4.9.2/libcilkrts/include/cilktools/fake_mutex.h
gcc-4.9.2/libcilkrts/include/cilktools/lock_guard.h
gcc-4.9.2/libcilkrts/include/cilktools/cilkscreen.h
gcc-4.9.2/libcilkrts/include/internal/
gcc-4.9.2/libcilkrts/include/internal/cilk_version.h
gcc-4.9.2/libcilkrts/include/internal/rev.mk
gcc-4.9.2/libcilkrts/include/internal/abi.h
gcc-4.9.2/libcilkrts/include/internal/cilk_fake.h
gcc-4.9.2/libcilkrts/include/internal/metacall.h
gcc-4.9.2/libcilkrts/configure.ac

utilForever@DESKTOP-2E5J5K8 /usr/src
$ |

```

- 플랫폼 및 경로 설정
 - o export TARGET=x86_64-pc-linux
 - o export PREFIX=/usr/cross
 - o export PATH=\$PREFIX/bin:\$PATH
- 플랫폼 디렉터리, 64비트 지원과 관련된 빌드 옵션 설정
 - o ./configure --target=\$TARGET --prefix=\$PREFIX --disable-nls --enable-languages=c --without-headers --disable-shared --enable-multilib

```

/usr/src/gcc-4.9.2
checking where to find the target gcc... just compiled
checking where to find the target gcj... pre-installed
checking where to find the target gfortran... pre-installed
checking where to find the target gccgo... pre-installed
checking where to find the target ld... pre-installed in /usr/cross/x86_64-pc-linux/bin
checking where to find the target lipo... pre-installed
checking where to find the target nm... pre-installed in /usr/cross/x86_64-pc-linux/bin
checking where to find the target objdump... pre-installed in /usr/cross/x86_64-pc-linux/bin
checking where to find the target ranlib... pre-installed in /usr/cross/x86_64-pc-linux/bin
checking where to find the target readelf... pre-installed
checking where to find the target strip... pre-installed in /usr/cross/x86_64-pc-linux/bin
checking where to find the target windres... pre-installed
checking where to find the target windmc... pre-installed
checking whether to enable maintainer-specific portions of Makefiles... no
configure: creating ./config.status
config.status: creating Makefile

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ |

```


- 빌드 환경에 대한 정보 수집 : make configure-host

```

/usr/src/gcc-4.9.2
checking whether stripping libraries is possible... yes
checking if libtool supports shared libraries... yes
checking whether to build shared libraries... no
checking whether to build static libraries... yes
checking how to run the C preprocessor... gcc -E
checking for stdlib.h... (cached) yes
checking for unistd.h... (cached) yes
checking for getpagesize... yes
checking for working mmap... no
checking for memcpy... yes
checking for strerror... yes
checking for unistd.h... (cached) yes
configure: updating cache ./config.cache
configure: creating ./config.status
config.status: creating Makefile
config.status: executing default-1 commands
Adding multilib support to Makefile in ../.././zlib
multidir=
with_multisubdir=
config.status: executing depfiles commands
config.status: executing libtool commands

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ |

```

- 빌드 과정에서 사용하는 라이브러리 복사

- cp /lib/gcc/i686-pc-cygwin/4.9.2/libgcc_s.dll.a /lib/gcc/i686-pc-cygwin/4.9.2/libgcc_s.a
- cp /lib/libmpfr.dll.a /lib/libmpfr.a
- cp /lib/libgmp.dll.a /lib/libgmp.a

```

/usr/src/gcc-4.9.2
checking for strerror... yes
checking for unistd.h... (cached) yes
configure: updating cache ./config.cache
configure: creating ./config.status
config.status: creating Makefile
config.status: executing default-1 commands
Adding multilib support to Makefile in ../.././zlib
multidir=
with_multisubdir=
config.status: executing depfiles commands
config.status: executing libtool commands

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ cp /lib/gcc/i686-pc-cygwin/4.9.2/libgcc_s.dll.a /lib/gcc/i686-pc-cygwin/4.9.2/libgcc_s.a

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ cp /lib/libmpfr.dll.a /lib/libmpfr.a

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ cp /lib/libgmp.dll.a /lib/libgmp.a

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ |

```

- GCC 빌드 : make all-gcc

```

/usr/src/gcc-4.9.2
Unescaped left brace in regex is deprecated, passed through in regex; marked by
<-- HERE in m/^\@strong{ <-- HERE (.*)}$/ at ../.././gcc/./contrib/texi2pod.pl
line 319.
echo timestamp > doc/gcc.1
(pod2man --center="GNU" --release="gcc-4.9.2" --date=2014-10-30 --section=1 gcc.
pod > doc/gcc.1.TS$ && \
    mv -f doc/gcc.1.TS$ doc/gcc.1) || \
    (rm -f doc/gcc.1.TS$ && exit 1)
echo timestamp > gpl.pod
perl ../.././gcc/./contrib/texi2pod.pl ../.././gcc/doc/include/gpl_v3.texi > gp
l.pod
Unescaped left brace in regex is deprecated, passed through in regex; marked by
<-- HERE in m/^\@strong{ <-- HERE (.*)}$/ at ../.././gcc/./contrib/texi2pod.pl
line 319.
echo timestamp > doc/gpl.7
(pod2man --center="GNU" --release="gcc-4.9.2" --date=2014-10-30 --section=7 gpl.
pod > doc/gpl.7.TS$ && \
    mv -f doc/gpl.7.TS$ doc/gpl.7) || \
    (rm -f doc/gpl.7.TS$ && exit 1)
rm gcc.pod
make[1]: Leaving directory '/usr/src/gcc-4.9.2/host-i686-pc-cygwin/gcc'

utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ |

```

- GCC 설치 : make install-gcc

```
/usr/src/gcc-4.9.2
( cd /usr/cross/bin && \
ln x86_64-pc-linux-gcc.exe x86_64-pc-linux-gcc-tmp.exe && \
mv -f x86_64-pc-linux-gcc-tmp.exe x86_64-pc-linux-x86_64-pc-linux-gcc.exe );
\
fi
/usr/bin/install -c lto-wrapper.exe /usr/cross/libexec/gcc/x86_64-pc-linux/4.9.2
/lto-wrapper.exe
for i in gcc-ar gcc-nm gcc-ranlib; do \
install_name='echo $i|sed 's/^x86_64-pc-linux-/' ; \
target_install_name=x86_64-pc-linux-'echo $i|sed 's/^x86_64-pc-linux-/' ; \
rm -f /usr/cross/bin/$install_name.exe ; \
/usr/bin/install -c $i.exe /usr/cross/bin/$install_name.exe ; \
if test -f gcc-cross.exe; then \
;; \
else \
rm -f /usr/cross/bin/$target_install_name.exe; \
( cd /usr/cross/bin && \
ln $install_name.exe $target_install_name.exe ) ; \
fi ; \
done
make[1]: Leaving directory '/usr/src/gcc-4.9.2/host-i686-pc-cygwin/gcc'
utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ |
```

- GCC 크로스 컴파일러 관련 파일 확인

```
/usr/cross/bin
utilForever@DESKTOP-2E5J5K8 /usr/src/gcc-4.9.2
$ cd /usr/cross
utilForever@DESKTOP-2E5J5K8 /usr/cross
$ cd bin
utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ ls
x86_64-pc-linux-addr2line.exe      x86_64-pc-linux-gprof.exe
x86_64-pc-linux-ar.exe           x86_64-pc-linux-ld.bfd.exe
x86_64-pc-linux-as.exe           x86_64-pc-linux-ld.exe
x86_64-pc-linux-c++filt.exe      x86_64-pc-linux-nm.exe
x86_64-pc-linux-cpp.exe          x86_64-pc-linux-objcopy.exe
x86_64-pc-linux-elfedit.exe      x86_64-pc-linux-objdump.exe
x86_64-pc-linux-gcc.exe          x86_64-pc-linux-ranlib.exe
x86_64-pc-linux-gcc-4.9.2.exe    x86_64-pc-linux-readelf.exe
x86_64-pc-linux-gcc-ar.exe       x86_64-pc-linux-size.exe
x86_64-pc-linux-gcc-nm.exe       x86_64-pc-linux-strings.exe
x86_64-pc-linux-gcc-ranlib.exe   x86_64-pc-linux-strip.exe
x86_64-pc-linux-gcov.exe
utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ |
```

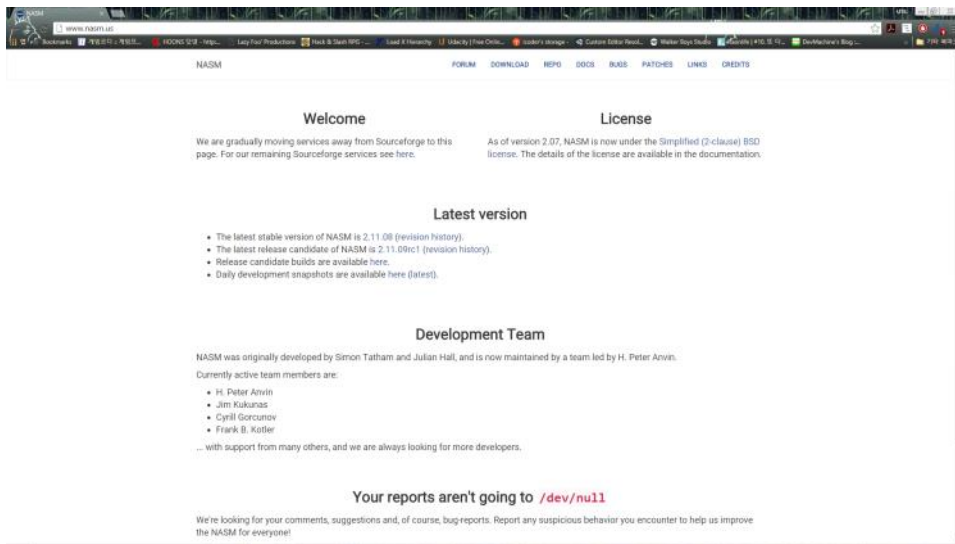
- GCC 설치 확인과 32비트/64비트 지원 유무 확인 : `/usr/cross/bin/x86_64-pc-linux-gcc -dumpspecs | grep -A1 multilib_options`

```
/usr/cross/bin
$ ls
x86_64-pc-linux-addr2line.exe      x86_64-pc-linux-gprof.exe
x86_64-pc-linux-ar.exe           x86_64-pc-linux-ld.bfd.exe
x86_64-pc-linux-as.exe           x86_64-pc-linux-ld.exe
x86_64-pc-linux-c++filt.exe      x86_64-pc-linux-nm.exe
x86_64-pc-linux-cpp.exe          x86_64-pc-linux-objcopy.exe
x86_64-pc-linux-elfedit.exe      x86_64-pc-linux-objdump.exe
x86_64-pc-linux-gcc.exe          x86_64-pc-linux-ranlib.exe
x86_64-pc-linux-gcc-4.9.2.exe    x86_64-pc-linux-readelf.exe
x86_64-pc-linux-gcc-ar.exe       x86_64-pc-linux-size.exe
x86_64-pc-linux-gcc-nm.exe       x86_64-pc-linux-strings.exe
x86_64-pc-linux-gcc-ranlib.exe   x86_64-pc-linux-strip.exe
x86_64-pc-linux-gcov.exe

utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ /usr/cross/bin/x86_64-pc-linux-gcc -dumpspecs | grep -A1 multilib_options
*multilib_options:
m64/m32

utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ ^C
utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ |
```

7. NASM 설치 : <http://www.nasm.us>



- <http://www.nasm.us/pub/nasm/releasebuilds/2.11.08/win32/> 에서 nasm-2.11.08-win32.zip 를 다운로드 한 뒤 C:\Cygwin\bin에 압축 풀기 (nasm.exe, ndisasm.exe 파일이 bin 폴더에 오도록)
- NASM 설치 확인 : nasm -version

```

/usr/cross/bin
x86_64-pc-linux-gcc-nm.exe      x86_64-pc-linux-strings.exe
x86_64-pc-linux-gcc-ranlib.exe x86_64-pc-linux-strip.exe
x86_64-pc-linux-gcov.exe

utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ /usr/cross/bin/x86_64-pc-linux-gcc -dumpspeaks | grep -A1 multilib_options
^C
utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ nasm --version
nasm: error: unrecognised option '--version'
nasm: error: no input file specified
type 'nasm -h' for help

utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ nasm -version
NASM version 2.11.08 compiled on Feb 21 2015

utilForever@DESKTOP-2E5J5K8 /usr/cross/bin
$ |

```

8. Eclipse 설치 : <http://www.eclipse.org> (Eclipse IDE for C/C++ Developers 항목을 설치)
9. QEMU 설치 : <http://www.qemu.org>
 - QEMU for Windows 2.5.0 설치 : <http://qemu.weilnetz.de/> (32비트 또는 64비트 설치)
 - 실행 확인 : qemu-system-x86_64.exe


```
QEMU
Machine View
Boot failed: could not read the boot disk
Booting from Floppy...
Boot failed: could not read the boot disk
Booting from DVD/CD...
Boot failed: Could not read from CDROM (code 0003)
Booting from ROM...
iPXE (PCI 00:03.0) starting execution...ok
iPXE initialising devices...ok

iPXE 1.0.0+ (4e03a) -- Open Source Network Boot Firmware -- http://ipxe.org
Features: DNS HTTP iSCSI TFTP AoE ELF MBOOT PXE bzImage Menu PXEXT

net0: 52:54:00:12:34:56 using 82540em on PCI00:03.0 (open)
[Link:up, TX:0 TXE:0 RX:0 RXE:0]
Configuring (net0 52:54:00:12:34:56)..... ok
net0: 10.0.2.15/255.255.255.0 gw 10.0.2.2
Nothing to boot: No such file or directory (http://ipxe.org/2d03e13b)
No more network devices

No bootable device.
```