

제주대학교 컴퓨터공학전공 <오픈소스 개발 방법론>

개발 방법론 II: 버그/패치/스택일

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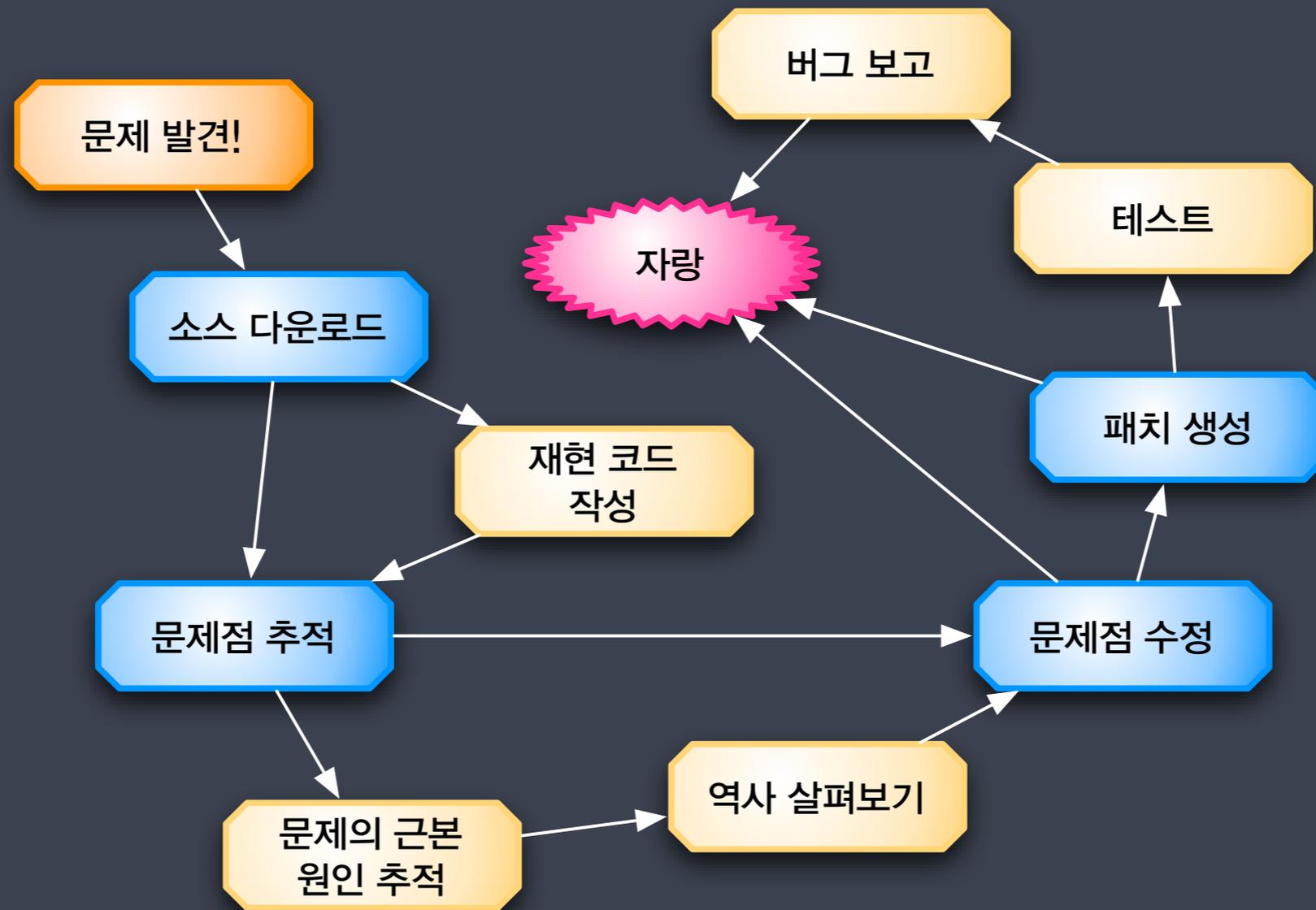


개요

버그 추적하기
패치 다루기
오픈소스 스타일

그림



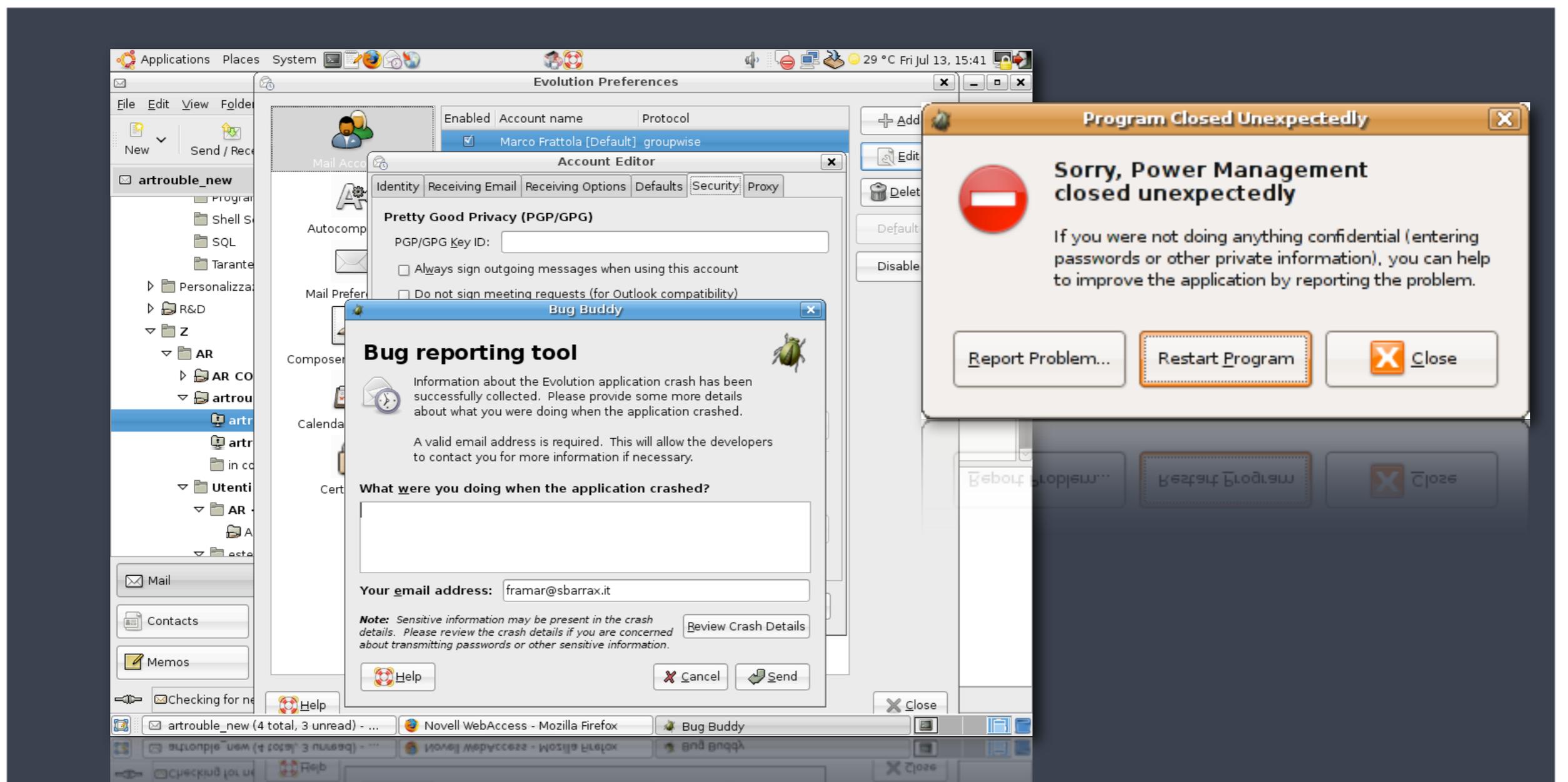


버그 / 패치 기여의 전체 구조



버그





버그 발견의 순간!

언제 봐도 만감이 교차하는 세그폴트!

버그를 만나는 또 다른 상황

- ▶ 남들 잘 안 하는 것!
- ▶ 새로운 플랫폼
- ▶ 새로운 컴파일러
- ▶ 새로운 라이브러리
- ▶ 색다른 사용법
- ▶ 오래된 프로그램

그림



그림

의도적으로 버그 찾아 헤메기

쓰다가 어쩔 수 없이 만나게 되는 경우 뿐만 아니라 버그를 일부러 찾아다니다가 만나는 방법도 있다.



눈으로 열심히 보기

그림

의도적으로 버그 찾아 헤메기

쓰다가 어쩔 수 없이 만나게 되는 경우 뿐만 아니라 버그를 일부러 찾아다니다가 만나는 방법도 있다.



눈으로 열심히 보기

실시간분석

```
⊕ 11 30727 27 bytes in 1 blocks are definitely lost in loss record 10
⊕ 12 30727 LEAK SUMMARY:
    Reachable blocks (those to which a pointer was found)
    To see them, rerun with: --show-reachable=yes
    ---13 30726 ERROR SUMMARY: 15 errors from 8 contexts (suppress
    malloc/free: in use at exit: 44,982 bytes in 1,235 blocks
    malloc/free: 2,015 allocs, 780 frees, 614,955 bytes allo
    For counts of detected errors, rerun with: -v
    searching for pointers to 1,235 not-freed blocks.
    checked 150,032 bytes.
⊖ 14 30726 LEAK SUMMARY:
    Reachable blocks (those to which a pointer was found)
    To see them, rerun with: --show-reachable=yes
    ---1   definitely lost: 0 bytes in 0 blocks.
    ---2   possibly lost: 0 bytes in 0 blocks.
    ---3   still reachable: 44,982 bytes in 1,235 blocks.
    ---4   suppressed: 0 bytes in 0 blocks.
---15 30729 ERROR SUMMARY: 15 errors from 8 contexts (suppress
    malloc/free: in use at exit: 45,494 bytes in 1,254 blocks
```

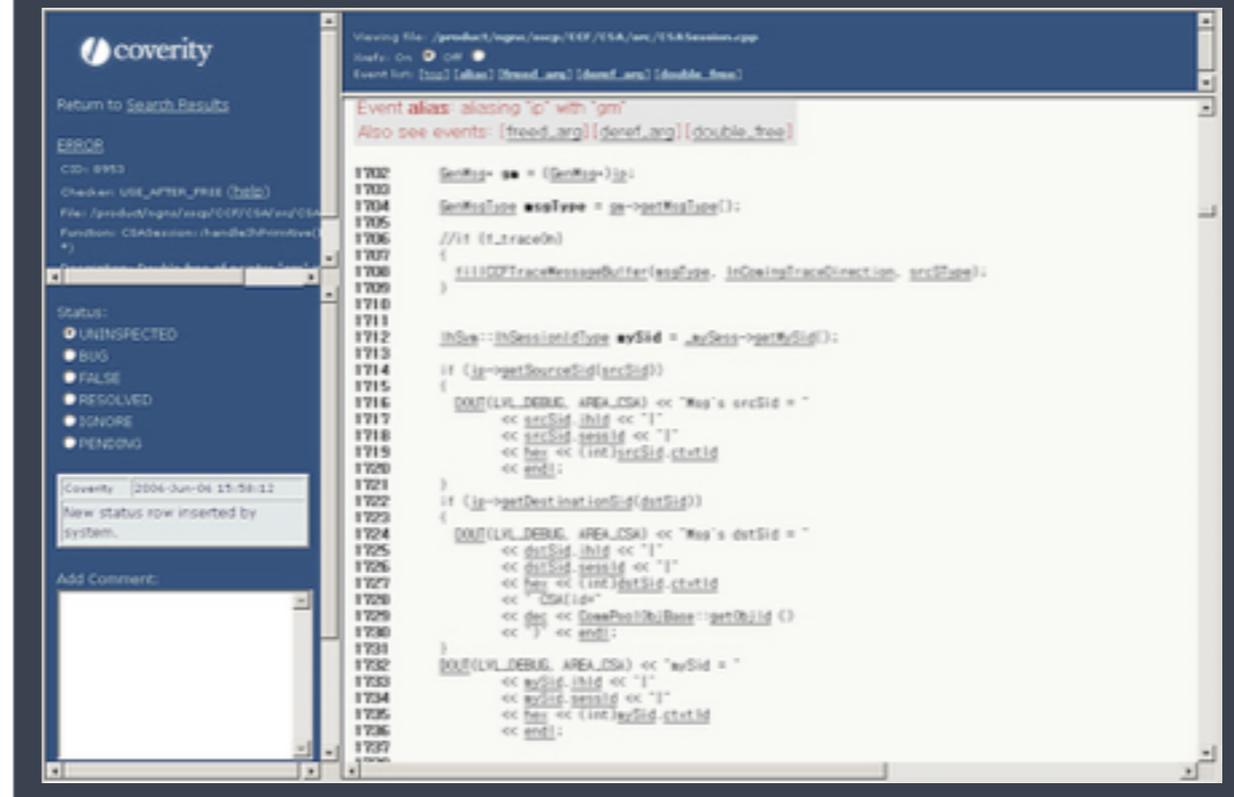
의도적으로 버그 찾아 헤메기

쓰다가 어쩔 수 없이 만나게 되는 경우 뿐만 아니라 버그를 일부러 찾아 다니다가 만나는 방법도 있다.

눈으로 열심히 보기

정형분석

실시간분석



의도적으로 버그 찾아 헤메기

쓰다가 어쩔 수 없이 만나게 되는 경우 뿐만 아니라 버그를 일부러 찾아 다니다가 만나는 방법도 있다.



눈으로 열심히 보기

정형분석

테스트 확장하기

실시간분석

Unit Test Results

Designed for use with [JUnit](#) and [Ant](#). Generated on Oct

Package org.jboss.test.cache.test.generic

Classes

Name	Tests	Errors	Failures
FqnUnitTestCase	8	0	0
GlobalTransactionUnitTestCase	3	0	0
IdentityLockUnitTestCase	10	0	0
LockMapUnitTestCase	3	0	0
LockUnitTestCase	4	0	0
NonBlockingWriterLockUnitTestCase	11	0	0
PropertyConfiguratorUnitTestCase	1	0	0
ReadWriteLockWithUpgradeUnitTestCase	11	0	0

의도적으로 버그 찾아 헤메기

쓰다가 어쩔 수 없이 만나게 되는 경우 뿐만 아니라 버그를 일부러 찾아다니다가 만나는 방법도 있다.



버그 확인

```
Search: [ ] Search [ ] Reset [ ]
[ ] Subjects [ ] Authors [ ] Bodies for list 'freebsd-ports'
Set Page Width: [80] [90] [100] [120]

freebsd-ports
  2007-10-01 - 2007-11-01 (206 messages)
  2007-09-01 - 2007-10-01 (522 messages)

Next → Last ↓
1. 2007-10-11 [1] portmaster 1.21 - "cannot create" messages freebsd-p John Marshall
2. 2007-10-11 [6] beryl missing windows decorations freebsd-p Petr Holub
3. 2007-10-11 [1] Re: ports/115888:patch: optionify syputils/screen freebsd-p Cy Schubert
4. 2007-10-11 [1] ruby-openid >= 0.40.1 freebsd-p Dan Langille
5. 2007-10-10 [3] gcc42 won't fetch freebsd-p Jung-uk Kim
6. 2007-10-10 [8] The scandalous status of linux-flashplugin? freebsd-p Juergen Lock
7. 2007-10-10 [2] apache startup fails freebsd-p Meenoo Shivda
8. 2007-10-10 [2] Re: xorg 7.3; xorgcfg is missing freebsd-p Florent Thoum
9. 2007-10-10 [2] Help2man configure fails freebsd-p Jeremy Chadwi
10. 2007-10-10 [1] FreeBSD Ports: libidn-0.6.14 freebsd-p Tex Texin
11. 2007-10-10 [1] java/eclipse-omf 2.2.3 not fetchable freebsd-p Andriy Gapon
12. 2007-10-10 [1] can not upgrade to math/gnuplot 4.2.2 freebsd-p Andriy Gapon
13. 2007-10-10 [3] subanking update? freebsd-p G. Paul Fiehb
14. 2007-10-09 [9] NTFS-3G mount during boot freebsd-p Novembre
15. 2007-10-09 [7] Python on 64-bit AMD?? freebsd-p Nicola Vitale
16. 2007-10-09 [3] Re: The scandalous status of linux freebsd-p Mikhail Teter
17. 2007-10-09 [1] FreeBSD Ports: proftpd-1.3.1.r1_5 freebsd-p pridaltest
18. 2007-10-08 [3] editors/vim -- long fetch times freebsd-p Pav Lucistnik
19. 2007-10-08 [1] xorg-7.3.1 build: dependence issue freebsd-p Artem Kim
20. 2007-10-08 [2] Current unassigned ports problem reports freebsd-p FreeBSD bugma
21. 2007-10-08 [2] PHP4 -> PHP5 freebsd-p Alex Dupre
22. 2007-10-07 [2] Asterisk-App-Notify 1.0 freebsd-p Mayo Jordanov
23. 2007-10-07 [6] Has portmaster gone insane? freebsd-p Doug Barton
24. 2007-10-07 [12] idna: static builds freebsd-p Dmitry Maraka
25. 2007-10-07 [4] x11/ati-driver freebsd-p mr. phreak
26. 2007-10-07 [1] Kernel modules installed via the ports Makefile freebsd-p Edwin Grootthu
27. 2007-10-06 [1] FreeBSD Ports: qagags-0.99.9 freebsd-p Daniel_Dvořák
28. 2007-10-06 [1] NTFS-3G mount at during boot freebsd-p Novembre
29. 2007-10-06 [1] libpano12 is broken freebsd-p Willy Picard
30. 2007-10-06 [3] INDEX now builds successfully on 5.x freebsd-p Erwin Lansing

Next → Last ↓
```

메일링리스트



버그 확인

메일링리스트

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koders
Searching 742,609,048 lines of open source code.

PyDict_ Search

All Languages All Licenses

Results 1-6 of about 6 results found for "PyDict_" in 0.19 seconds

dictobject.c
/* Dictionary object implementation using a hash table */
#include "Python.h"
typedef PyDictEntry dictentry;
typedef PyDictObject dictobject;
/* Define this out if you don't want conversion statistics on exit. */

Language: C
LOC: 1523
SourceForge: Python/iX (project search) : .../pythonix/pythonix/pythonix/Objects/dictobject.c

dictobject.c
/*
#include "Python.h"
typedef PyDictEntry dictentry;
typedef PyDictObject dictobject;
/* Set a key error with the specified argument, wrapping it in a

Language: C
LOC: 1885
Python: python (project search) : .../p/python/trunk/Objects/dictobject.c

Now You Can Search Your Code!
Introducing:
koders Pro Edition

소스코드



버그 확인

메일링리스트

소스코드



The screenshot shows a Google search interface with the query "notify question section contains". The search results are displayed in a list format. The first result is a web document titled "Re: ...notify question section contains no SOA" with a link to an osdir.com page. The second result is a Linuxarkivet mailing list message with a subject line "Re: notify question section contains no SOA: 1 Time(s)". The third result is another Linuxarkivet mailing list message with a subject line "Re: notify question section contains no SOA: 1 Time(s); From: Rob Payne".

Google

버그 확인

메일링리스트

소스코드

Google

```
0256 (bbc) ah, I do have got jpeglib.h
0256 (dirt) bbc: i sent you one, too
0256 (bbc) dirt: I got it, yes
0256 (bbc) dirt: thanks
0257 (dirt) it's ok
0257 (bbc) did you put it in usr/include for me :-)?
0257 (bbc) ?
0258 (bbc) hm, now I have got problems with the xjt plug-in, whatever that may be
0258 (bbc) I am going to bed and try further tomorrow
0258 (bbc) thanks all
0258 (dirt) good night sleep
0259 ::: bbc [branko@collin.xs4all.nl] has quit [zzz]
0301 ::: nic ["nic@modemcable036.168-201-24.hull.mc.videotron.ca"] has joined #gimp
0302 ::: nic-away [nic@modemcable036.168-201-24.hull.mc.videotron.ca] has quit [Read error: 104
(Connection reset by peer)]
0309 ::: bex ["rjp@0x3ef27365.abnxi.paisdn.tele.dk"] has quit [Ping timeout: 600 seconds]
0312 ::: natilla ["cesar@dup-200-64-32-233.prodigy.net.nx"] has joined #gimp
0312 ::: carol [carol@24-56-193-055.ndwi.voyager.net] has joined #gimp
0313 (docpi) carol,
0313 (carol) hi docpi
0314 (docpi) carol: My Michigan girl's going to come and visit over the beginning of March. :)
0314 ::: omegakidd ["omegakidd@fdslppp130.wpls.uswest.net"] has joined #gimp
0314 ::: natilla ["cesar@dup-200-64-32-233.prodigy.net.nx"] has left #gimp []
0314 (rockwlr) re carol
0314 (carol) ah, lucky girl
0314 (carol) hi rockwlr
0315 ::: nic ["nic@modemcable036.168-201-24.hull.mc.videotron.ca"] has quit [Read error: 104
(Connection reset by peer)]
0316 ::: walterfb ["walterfb@equate3.soc.nrao.edu"] has joined #gimp
0317 (dirt) hey carol
0317 (carol) hi dirt, whats up?
0318 (dirt) Seen jacob's ladder again... amazing
0319 (carol) yes, that is a great movie.
0320 (dirt) carol: is it true that pentagon was accused of trying such a drug?
0321 (muks) i feel like throwing up everytime i play q2, although q3 and quakeforge are fine
0321 (carol) muks: i suggest not playing q2
0321 (muks) carol: heh
0321 (carol) dirt: prolly, i wouldn't put it past them
0324 ::: oliver [oliver@p508FCB7B.dip.t-dialin.net] has joined #gimp
0325 (dirt) bye, all
0325 ::: dirt [dirt@dialup41.istanbul3.basari.net.tr] has quit [Thanks. But, no, thanks.]
0330 ::: oliver [oliver@p508FCB7B.dip.t-dialin.net] has left #gimp []
0341 ::: bbeattie ["bbeattie@208.186.134.6"] has quit [Remote closed the connection]
0343 ::: montana [montana@cs150058.pp.htv.fi] has quit [Read error: 73 (Connection reset by
peer)]
0344 ::: Tonk32 [tonk32@p19E630BF.dip.t-dialin.net] has quit [Ping timeout]
[=]-(0352)-(0Stric (+bcdfiknorswoyz))-(1:#gimp (+lnt 133))----- (Act: 2,9,10,11,13)-[=]
#gimp> |
```

IRC



잡은 버그의 종류

- ▶ Segmentation Fault (**SIGSEGV**), Bus Error (SIGBUS)
- ▶ 오동작
- ▶ 메모리 누수
- ▶ 데드락, **무한 루프**
- ▶ Aborted (**SIGABRT**), Assertion Error
- ▶ **컴파일 오류**
- ▶ 기능 **미비** 또는 기능 검출 오류
- ▶ **뱅치는** 인터페이스와 문서



```
/usr/src/gnu/usr.bin/binutils/libbfd/../../../../cont  
/usr/src/gnu/usr.bin/binutils/libbfd/../../../../cont  
function `_bfd_elf_compute_section_file_positions':  
/usr/src/gnu/usr.bin/binutils/libbfd/../../../../cont  
internal compiler error: Segmentation fault  
Please submit a full bug report,  
with preprocessed source if appropriate.  
See <URL:http://gcc.gnu.org/bugs.html> for instructions  
*** Error code 1
```

```
PyLocale_setlocale (self=0x0, args=0x82dc7dc)  
    at /home/perky/cvs/python/trunk/Modules/_localemodule.c:167  
    ((int *)0)[0] = 50;  
(gdb) bt  
#0 PyLocale_setlocale (self=0x0, args=0x82dc7dc)  
    at /home/perky/cvs/python/trunk/Modules/_localemodule.c:167  
#1 0x0812eb74 in PyCFunction_Call (func=0x82dc45c, arg=0x0, kw=0x0)  
    at ../Objects/methodobject.c:73  
#2 0x080d9501 in call_function (pp_stack=0xbfbfd9bc, op=0x0, arg=0x0)  
#3 0x080d5818 in PyEval_EvalFrameEx (f=0x830b814, throwflag=0, globals=0x0, locals=0x0, closure=0x0)  
#4 0x080d77dd in PyEval_EvalCodeEx (co=0x82cde08, global=0x0, local=0x0, args=0x82a3758, argcount=2, kws=0x82a3760, kwcount=0, closure=0x0)  
    at ../Python/ceval.c:2851  
#5 0x080d991f in fast_function (func=0x82dad54, pp_stack=0xbfbfd9bc, op=0x0, arg=0x0)  
    at ../Python/ceval.c:3671
```

Segmentation Fault

버퍼 오버플로우, 오프바이윈, 에러 대처 부족, 논리적 오류 등..



```
lucy(perky):~% python
Python 2.5.1 (r251:54863, Aug 14 2007, 15:40:27)
[GCC 3.4.6 [FreeBSD] 20060305] on freebsd6
Type "help", "copyright", "credits" or "license" for more information.
>>> 1 + 1
7
>>> ????!
File "<stdin>", line 1
    ????!
    ^
SyntaxError: invalid syntax
```

오동작

프로그램이 죽지도 않지만 **의도대**
로 돌아가지 않는 경우



```

last pid: 39621; load averages: 9.04, 9.03, 9.00          up 380+06:14:13 05:14:02
65 processes: 1 running, 64 sleeping
CPU states: 30.0% user, 0.0% nice, 69.2% system, 0.0% interrupt, 0.2% idle
Mem: 323M Active, 368M Inact, 123M Wired, 43M Cache, 111M Buf, 18M Free
Swap: 2048M Total, 896M Used, 1151M Free, 34% Inuse

```

PID	USERNAME	THR	PRI	NICE	SIZE	RES	STATE	C	TIME	WCPU	COMMAND
60689	root	1	96	0	1484M	1210M	select	0	45:34	0.00%	perl5.8.8
20411	mysql	4	20	0	71784K	33420K	kserel	0	33.8H	0.00%	mysqld
22262	perky	1	96	0	26380K	4472K	select	0	39:20	0.00%	irssi
567	bind	1	96	0	12248K	4464K	select	0	17:15	0.00%	named
670	root	1	96	0	7860K	1148K	select	0	16:18	0.00%	ntpd
815	root	1	4	0	13008K	376K	select	1	13:23	0.00%	sshd
19707	root	1	96	0	3920K	576K	select	0	13:17	0.00%	master
10700	root	1	96	0	1720K	1102K	select	0	10:10	0.00%	rsync

메모리 누수



그림

데드락 / 무한루프



Assertion Error, SIGABRT

대부분 논리적 오류 또는 에러
상황 대처 미비

```
static PyObject *
dictbytype(PyObject *src, int scope_t
{
    Py_ssize_t pos = 0, i = offset
    PyObject *k, *v, *dest = PyDi

    assert(offset >= 0);
    if (dest == NULL)
        return NULL;

    while (PyDict_Next(src, &pos,
        /* XXX this should pr
        assert(PyInt_Check(v)
        scope = (PyInt_AS_LON

        if (scope == scope_ty
            PyObject *tup
            if (item == N
                Py_DE
                retur

            }
            i++;
            tuple = PyTuple
```



컴파일 오류

```
gcc -fPIC -fno-strict-aliasing -DDEBUG -g -O3 -Wall -Wstrict-prototypes -I. -I/usr/home/perky/cvs/python/trunk/./Include -I../Include -I. -I/usr/local/include -I/usr/home/perky/cvs/python/trunk/Include -I/usr/home/perky/cvs/python/trunk/portbld -c /usr/home/perky/cvs/python/trunk/Modules/socketmodule.c -o build/temp.freebsd-6.2-PRERELEASE-amd64-2.6/usr/home/perky/cvs/python/trunk/Modules/socketmodule.o
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c: In function `makesockaddr':
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:1131: error: structure has no member named `hci_dev'
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c: In function `getsockaddrarg':
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:1367: error: structure has no member named `hci_dev'
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c: In function `init_socket':
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4468: error: `SOL_HCI' undeclared (first use in this function)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4468: error: (Each undeclared identifier is reported only once
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4468: error: for each function it appears in.)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4469: error: `HCI_TIME_STAMP' undeclared (first use in this function)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4470: error: `HCI_DATA_DIR' undeclared (first use in this function)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4471: error: `HCI_FILTER' undeclared (first use in this function)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4472: error: `HCI_FILTER' undeclared (first use in this function)
/usr/home/perky/cvs/python/trunk/Modules/socketmodule.c:4473: error: `HCI_FILTER' undeclared (first use in this function)
```



버그 추적

- ▶ SCM 로그, **ChangeLog**, 버그리포트 찾아보기
- ▶ SCM **이진** 검색, SCM annotation
- ▶ 소스를 **뚫어져라** 쳐다보기!
- ▶ `grep -i`, google, lxr, 리팩토링 뷰어들의 도움을 받기
- ▶ 디버깅의 고전, **printf** & `assert!`
- ▶ 디버거 **손추적**
- ▶ **과학적** 버그 추적



2006-08-02 Federico Di Gregorio <fog@initd.org>

- * Release 2.0.4.
- * Fixed bug in float conversion (check for NULL string was erroneously removed in 2.0.3!)

2006-07-31 Federico Di Gregorio <fog@initd.org>

- * Release 2.0.3.
- * `psycopg/cursor_type.c`: applied patch from jbellis (#113) to allow column selection in `.copy_from()`.
- * `psycopg/psycopgmodule.c`: fixed memory leak in custom exceptions (applied patch from #114).

2006-07-26 Federico Di Gregorio <fog@initd.org>

- * `psycopg/adapter_datetime.c` (`pydatetime_str`): fixed error

최근 변경사항, 버그리포트 검색하기



You may view summaries by [Severity](#), [State](#), [Category](#), or [Responsible Party](#). You may also sort by [Last-Modified](#), [Category](#), or [Responsible Party](#). You may also use a [specific query](#). [Include closed reports too](#).

Critical problems

Serious problems

S	Submitted	Tracker	Resp.	Description
o	2005/11/11	i386/88853	i386	[hang] SMP system FreeBSD 6.0-STABLE crashed while transferring file via NFS to
o	2007/06/06	kern/113406		[xl] Page fault in XL0 device driver (regression)
o	2007/06/21	kern/113895		[xl] xl0 fails on 6.2-RELEASE but worked fine on 5.5-RELEASE (regression)

3 problems total.

Non-critical problems

S	Submitted	Tracker	Resp.	Description
s	2000/05/15	kern/18558	silby	[xl] 3COM 905B really really slow when using multiple adapter
f	2004/05/12	kern/66564		[xl] [patch] 3c920-MV00 PHY detection problem
o	2005/07/12	kern/83354		[xl] When two 3c905's are in a Vectra VI dhcp fails to give an IP for the requested
o	2005/11/04	docs/88477	doc	Possible addition to xl(4) manpage, Diagnostics section
f	2007/06/17	ports/113799	portmgr	[PATCH] ease USE_XLIB -> USE_XORG transition
o	2007/10/11	ports/117102	miwi	Update: xl1/xlockmore to 5.25

6 problems total.

최근 변경사항, 버그리포트 검색하기

			Rev	Chgset	Date	Author	Log Message
			@5936	[5936]	08/17/2007 11:33:34 PM	cmlenz	* Switch back to the <code>sys._getframe()</code> hack in the imp
			@5837	[5837]	07/15/2007 08:47:58 PM	cmlenz	Mark more strings as localizable.
			@5747	[5747]	06/24/2007 05:43:08 AM	athomas	Context constructor no longer accepts realm, id, version o
			@5650	[5650]	06/08/2007 05:21:48 PM	cboos	Fix unit test broken by r5646 , thanks eli for notice.
			@5646	[5646]	06/08/2007 04:08:05 PM	cboos	Python 2.5 is stricter about the requirement that <code>__repr_</code>
			@5554	[5554]	05/31/2007 11:38:24 AM	cboos	Raise <code>ResourceNotFound</code> exception when a Trac reso
			@5523	[5523]	05/28/2007 04:11:36 PM	cboos	Merged log:sandbox/timeline-api-tmp@5522 branch into tr
			@5514	[5514]	05/27/2007 01:33:52 PM	athomas	Merged TracDev/SecurityBranch . This introduces fine-gra
			@5466	[5466]	05/22/2007 06:07:10 PM	cboos	Temporarily reverting r5401 , as the change was incomple
			@5401	[5401]	05/15/2007 09:23:59 PM	cboos	WikiContext : don't store a reference to the db handle in a c
			@5388	[5388]	05/12/2007 10:46:47 PM	cboos	Error message template: when rendering TracError mess

SCM 이진검색

```

if (tstate == NULL)
    Py_FatalError("PyEval_AcquireThread: NULL new thread state");
/* Check someone has called PyEval_InitThreads() to create the lock */
assert(interpreter_lock);
PyThread_acquire_lock(interpreter_lock, 1);
if (PyThreadState_Swap(tstate) != NULL)
    Py_FatalError(
        "PyEval_AcquireThread: non-NULL old thread state");
}

void
PyEval_ReleaseThread(PyThreadState *tstate)
{
    if (tstate == NULL)
        Py_FatalError("PyEval_ReleaseThread: NULL thread state");
    if (PyThreadState_Swap(NULL) != tstate)
        Py_FatalError("PyEval_ReleaseThread: wrong thread state");
    PyThread_release_lock(interpreter_lock);
}

```

소스 검색으로 추적하기



```

if (tstate == NULL)
    Py_FatalError(
/* Check someone has
assert(interpreter_lo
PyThread_acquire_lock
if (PyThreadState_Swa
    Py_FatalError(
        "PyEv
}

void
PyEval_ReleaseThread(PyThread
{
    if (tstate == NULL)
        Py_FatalError(
    if (PyThreadState_Swa
        Py_FatalError(
    PyThread_release_lock
}

```



Cross-Referencing Linux

Linux/lib/devres.c

[[source navigation](#)]
[[diff markup](#)]
[[identifier search](#)]
[[freetext search](#)]
[[file search](#)]

Version: [[1.0.9](#)] [[1.2.13](#)] [[2.0.40](#)] [[2.2.26](#)] [[2.4.18](#)] [[2.4.20](#)] [[2.4.28](#)] [[2.6.10](#)] [[2.6.11](#)] [[2.6.17.13](#)] [[2.6.18](#)] [[2.6.20.1](#)] [[2.6.22](#)] [[2.6.22.6](#)]
Architecture: [[i386](#)] [[alpha](#)] [[arm](#)] [[ia64](#)] [[m68k](#)] [[mips](#)] [[mips64](#)] [[ppc](#)] [[s390](#)] [[sh](#)] [[sparc](#)] [[sparc64](#)] [[x86_64](#)]

```

1 #include <linux/pci.h>
2 #include <linux/io.h>
3 #include <linux/module.h>
4
5 static void devm_ioremap_release(struct device *dev, void *res)
6 {
7     iounmap(*(void __iomem **)res);
8 }
9
10 static int devm_ioremap_match(struct device *dev, void *res, void *match_data)
11 {
12     return *(void **)res == match_data;
13 }
14
15 /**
16  * devm_ioremap - Managed ioremap()
17  * @dev: Generic device to remap IO address for
18  * @offset: BUS offset to map
19  * @size: Size of map
20  *
21  * Managed ioremap(). Map is automatically unmapped on driver detach.
22  */
23 void __iomem *devm_ioremap(struct device *dev, unsigned long offset,
24                          unsigned long size)
25 {
26     void __iomem **ptr, *addr;
27
28     ptr = devres_alloc(devm_ioremap_release, sizeof(*ptr), GFP_KERNEL);
29     if (!ptr)
30         return NULL;
31
32     addr = ioremap(offset, size);
33     if (addr) {
34         *ptr = addr;
35         devres_add(dev, ptr);
36     } else
37         devres_free(ptr);
38
39     return addr;

```

소스 검색으로 추적하기

```
cysteine(perky):~/cvs/python/trunk% svn log Python/thread.cimore
Enter passphrase for key '/home/perky/.ssh/id_openlook':
-----
r50746 | neal.norwitz | 2006-07-21 16:59:47 +0900 (금, 21 7 2006) | 2 lines

Handle more memory allocation failures without crashing.

-----

r46919 | andrew.macintyre | 2006-06-14 00:04:24 +0900 (수, 14 6 2006) | 11 lines

Patch #1454481: Make thread stack size runtime tunable.

Heavily revised, comprising revisions:
46640 - original trunk revision (backed out in r46655)
46647 - markup fix (backed out in r46655)
46692:46918 merged from branch aimacintyre-sf1454481

branch tested on buildbots (Windows buildbots had problems
not related to these changes).

-----

r46655 | tim.peters | 2006-06-05 08:52:47 +0900 (월, 05 6 2006) | 16 lines
```

SCM로그, 변경사항



```

8683     guido /* for backward compatibility: export this interface */
8683     guido
7845     guido PyObject *
16421 twouters PyEval_CallObject(PyObject *func, PyObject *arg)
2475     guido {
7845     guido         return PyEval_CallObjectWithKeywords(func, arg, (PyObject *)NULL);
5311     guido }
8683     guido #define PyEval_CallObject(func, arg) \
8683     guido         PyEval_CallObjectWithKeywords(func, arg, (PyObject *)NULL)
5311     guido
7845     guido PyObject *
16421 twouters PyEval_CallObjectWithKeywords(PyObject *func, PyObject *arg, PyObject *kw)
5311     guido {
18572 jhylton         PyObject *result;
5311     guido
42894 hyeshik.chang     if (arg == NULL) {
7845     guido             arg = PyTuple_New(0);
42894 hyeshik.chang             if (arg == NULL)
42894 hyeshik.chang                 return NULL;
42894 hyeshik.chang     }
7845     guido     else if (!PyTuple_Check(arg)) {

```

SCM로그, 변경사항



```
Program received signal SIGSEGV, Segmentation fault.
[Switching to Thread 0x819b000 (LWP 100129)]
PyLocale_setlocale (self=0x0, args=0x82dc7dc)
    at /home/perky/cvs/python/trunk/Modules/_localemodule.c:167
167      ((int *)0)[0] = 50;
(gdb) bt
#0  PyLocale_setlocale (self=0x0, args=0x82dc7dc)
    at /home/perky/cvs/python/trunk/Modules/_localemodule.c:167
#1  0x0812eb74 in PyCFunction_Call (func=0x82dc45c, arg=0x82dc7dc, kw=0x0)
    at ../Objects/methodobject.c:73
#2  0x080d9501 in call_function (pp_stack=0xbfbfdfeb, oparg=2) at ../Python/ceval.c:3575
#3  0x080d5818 in PyEval_EvalFrameEx (f=0x830b814, throwflag=0) at ../Python/ceval.c:2287
#4  0x080d77dd in PyEval_EvalCodeEx (co=0x82cde08, globals=0x82dd0d4, locals=0x0,
    args=0x82a3758, argcount=2, kws=0x82a3760, kwcount=0, defs=0x82f7518, defcount=1,
    closure=0x0) at ../Python/ceval.c:2851
#5  0x080d991f in fast_function (func=0x82dad54, pp_stack=0xbfbfe5ec, n=2, na=2, nk=0)
    at ../Python/ceval.c:3671
```

디버거 백트레이스



```
#include <stdio.h>

int
main(void)
{
    int a, b, c;
    a = b = 1;
    c = a + b;
    assert(c == 2);
    printf("%d\n", c);
    return 0;
}
```

```
a = b = 1
c = a + b
assert c == 2
print c
```

assertion



그림

과학적 가설검증 버그추적



```
def test_subtraction(self):

    d1 = Decimal('-11.1')
    d2 = Decimal('22.2')

    #two Decimals
    self.assertEqual(d1-d2, Decimal('-33.3'))
    self.assertEqual(d2-d1, Decimal('33.3'))

    #with other type, left
    c = d1 - 5
    self.assertEqual(c, Decimal('-16.1'))
    self.assertEqual(type(c), type(d1))

    #with other type, right
    c = 5 - d1
    self.assertEqual(c, Decimal('16.1'))
    self.assertEqual(type(c), type(d1))
```

테스트 커버리지 높이기



버그 재현

- ▶ 버그 상황을 재현하는 **최소한**의 소스 (어이없어도 됨!)
- ▶ 소스는 **짧고** 테스트는 많으면 더욱 좋음!
- ▶ 원래의 **의도**를 잘 드러낼 수 있어야 함
- ▶ 되도록 **재현**하는데 수고가 적게 들어야함 (셀 스크립트!)
- ▶ **자동화**가 가능하면 더욱 좋음 (원래 프로그램이 사용하는 프레임워크로)



좋은 재현 코드의 예

```
for x in xrange(0x10000, 0x110000):
    ch = unichr(0xD7C0+(x>>10)) + unichr(0xDC00+(x & 0x3FF))
    try: ch.encode("iso_2022_jp") # CRASHES
    except UnicodeEncodeError: pass
```



좋은 재현 코드의 예

The problem shows up with the following code:

```
class s1:
    def __repr__(self):
        return 'ㄱㄱㄱ'

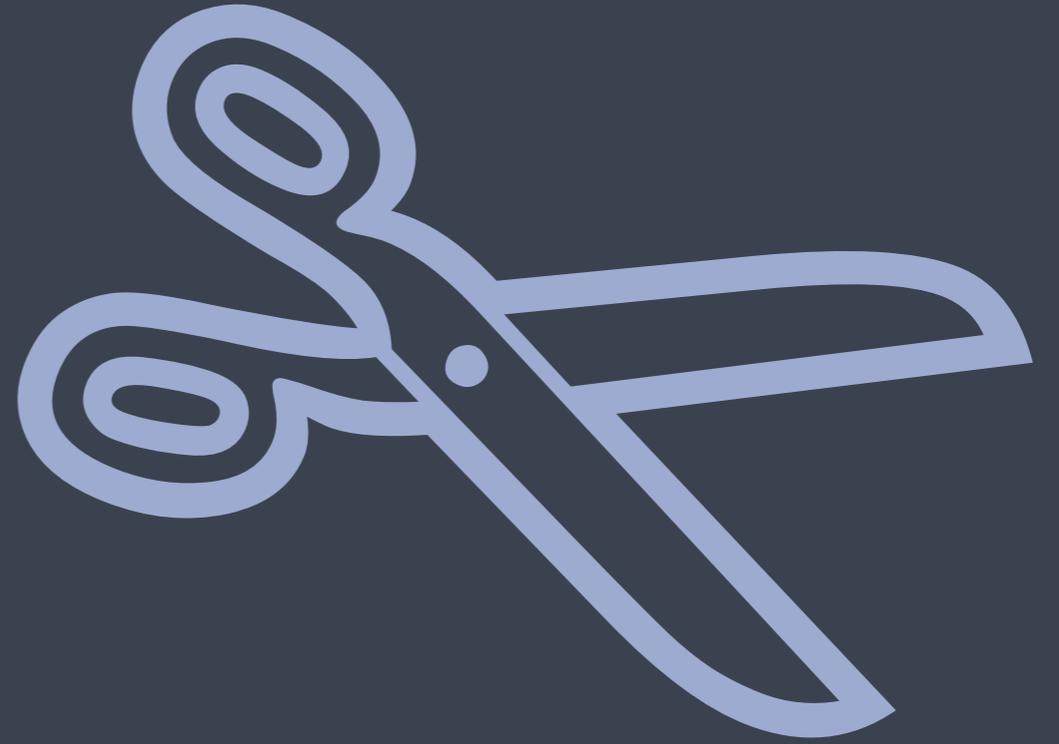
class s2:
    def __repr__(self):
        return u'ㄱㄱㄱ'

print repr(s1()), repr(s2())
```

I get the following results:

```
Python 2.3.5: ㄱㄱㄱ ㄱㄱㄱ
Python 2.4.2: ㄱㄱㄱ ㄱㄱㄱ
Python 2.4.3c1: ㄱㄱㄱ ㄱㄱㄱㄱ
```





패치



목적에 따라 다른 패치

- ▶ 원래 프로그램에서 버그를 “제대로” 고치는 패치
- ▶ 임시 방편으로 필요한 문제만 해결하는 패치
 - ▶ 개인적인 용도 외에, 어떤 패치가 필요한지 보여주기 위한 목적으로도 사용 가능
- ▶ 많은 사람들이 임시로 사용할 수 있는 패치
- ▶ 백포트, 포크 등 기능의 변경과 관련된 패치



패치 전략

- ▶ 가급적이면 테스트 자동화 먼저
- ▶ 우선 돌아가게 만들자!
- ▶ 조금씩 조금씩 제대로 된 위치/방법으로 바꿈
- ▶ 마치 원래 있었던 소스인 것처럼
 - ▶ 스타일 맞추기
 - ▶ 오버디자인을 경계하자
- ▶ 패치의 목적을 넘어서는 기능은 절대 넣으면 안 됨

그림



소스배포판에서 패치 만들기

diff로 생성

unidiff/context diff 선호를 확인

필요없는 파일이 포함되지 않도록
조심

quilt 패치 관리자

```
@@ -4278,7 +4319,8 @@
    }
    case STORE_DEREF:
    {
-         PyObject **freevars = f->f_localsplus +
+         PyObject **freevars = (f->f_localsplus +
+                                f->f_code->co_nlo
+
        PyObject *c = freevars[PEEKARGC)];
        if (PyCell_GET(c) == v)
            PyCell_Set(c, NULL);

@@ -4304,14 +4346,12 @@
        /* Now we own the last reference to 'v', so we c
        * in-place.
        */
-         int v_len = PyString_GET_SIZE(v);
-         int w_len = PyString_GET_SIZE(w);
-         if (_PyString_Resize(&v, v_len + w_len) != 0) {
+         if (_PyString_Resize(&v, new_len) != 0) {
            /* XXX if _PyString_Resize() fails, 'v'
            * de-referenced as it cannot be put back
```

```
*****
*** 4278,4284 ****
    }
    case STORE_DEREF:
    {
!         PyObject **freevars = f->f_localsp
        PyObject *c = freevars[PEEKARGC)];
        if (PyCell_GET(c) == v)
            PyCell_Set(c, NULL);

--- 4319,4326 ----
    }
    case STORE_DEREF:
    {
!         PyObject **freevars = (f->f_localsp
!                                f->f_code->
        PyObject *c = freevars[PEEKARGC)];
        if (PyCell_GET(c) == v)
            PyCell_Set(c, NULL);
*****
```



SCM 접근이 허용된 경우 패치 생성

- ▶ svn diff, cvs diff, hg diff, git diff
- ▶ 보통 HEAD (**trunk**)를 사용
- ▶ add/remove를 절대 잊지 않도록 조심!
- ▶ 백포트를 위한 패치
- ▶ 직접 전송 가능한 SCM

```
1  Index: web/css/main.css
2  =====
3  --- web/css/main.css (revision 17
4  +++ web/css/main.css (working cop
5  @@ -317,7 +318,7 @@
6     font-family:Helvetica, Arial, sa
7     _position:relative;
8  }
9  -#adbotwrap {
10  +#adbotwrap, div.adbotwrap {
11     width:842px;
12     margin:0 12px 0 12px;
13     text-align:center;
14  @@ -509,72 +510,78 @@
15  }
16  /* remove standard HTML list inde
17  \* remove standard HTML list inde
18  }
19  @@ -200,15 +210,18 @@
20  fexf-ajjdu:ceufel?
21  wadgru:0 jsbx 0 jsbx:
22  wjacu:845bx?
```

패치 보내기

- ▶ 비슷한 **버그** 보고가 없었는지 다시 확인
- ▶ **최근** 소스 저장고에서 고쳐지지 않았는지 다시 확인
- ▶ 버그 보고 “**잘**” 쓰기
- ▶ 보낼 매체 선택
 - ▶ **버그트래커**
 - ▶ 메일링 리스트, **개인적인** 메일



친구들 **동원**하기

패치 적용
명분 제공

펀드 제공

패치와 관련된 정치 활동

관심 끌어들이기

패치간 **의존성**
걸기

의도적 접근

주기적 업데이트

메일링 **리스트**, 버그 트래커

릴리스 **준비** 기간과 백포트/브랜
치 정책

열심히 활동하는 개발자, 영향력
있는 개발자를 파악하고 그 사람들
의 관심사를 **파악**



매력있는 패치

문제가 명확

재현이 쉬움

패치 첫인상이 좋음

패치 적용이 쉬움

부작용이 없음

관심을 끌 재미있는 주제

```
#endif

-void dump_tsc(int opcode, int ticked, uint64 inst0, ui
+void dump_tsc(int opcode, int ticked, uint64 inst0, ui
                uint64 loop0, uint64 loop1, uint64 intr0,
        {
                uint64 intr, inst, loop;
@@ -80,20 +87,22 @@

/* Forward declarations */
#ifdef WITH_TSC
-static PyObject *call_function(PyObject ***, int, uint64
+static PyObject * call_function(PyObject ***, int, uint64
        #else
-static PyObject *call_function(PyObject ***, int);
+static PyObject * call_function(PyObject ***, int);
        #endif
-static PyObject *fast_function(PyObject *, PyObject ***)
-static PyObject *do_call(PyObject *, PyObject ***, int)
-static PyObject *ext_do_call(PyObject *, PyObject ***,
-static PyObject *update_keyword_args(PyObject *, int, l
-static PyObject *update_star_args(int, int, PyObject *
-static PyObject *load_args(PyObject ***, int);
+static PyObject * fast_function(PyObject *, PyObject *
+static PyObject * do_call(PyObject *, PyObject ***, int
+static PyObject * ext_do_call(PyObject *, PyObject ***,
+static PyObject * update_keyword_args(PyObject *, int,
+
                PyObject *);
+static PyObject * update_star_args(int, int, PyObject *
+static PyObject * load_args(PyObject ***, int);
#define CALL_FLAG_VAR 1
```



그림

법적 고려사항

저작권 동의

패치 자체의 외부 소스 사용

추가 라이선스 적용

라이선스 간의 호환성

특히





스택일



스타일

- ▶ 소스코드 스타일
 - ▶ 모양: 들여쓰기, {}위치, 띄어쓰기, 가로폭, 탭/스페이스 등..
 - ▶ 의미: 문법적 요소 선택, 주석, 피해야할 문법, 이름짓기 등..
 - ▶ 배치: 파일이름, 파일의 배치, 파일 간의 관계 등..
- ▶ 사용자 인터페이스 스타일
- ▶ 커뮤니케이션 스타일
- ▶ 그 외의 스타일



코딩 관례

{ } 위치, 변수 선언 위치, else 위치, 들여쓰기 방법, 변수 이름 위치, 1줄 주석, 2줄 이상 주석, 헤더파일 순서, 매크로 뒤 이어쓰기, 포인터 별찍기, 금지하는 함수, 금지하는 비교식 등..

```
int main(argc, argv)
int argc;
char **argv;
{
    ...
    while (x == y) {
        something();
        somethingelse();
        if (some_error)
            do_correct();
        else
            continue_as_usual();
    }
    finalthing();
    ...
}
```

```
if (data != NULL && res > 0)
    if (!JS_DefineProperty(
        JS_NewStringCopyN(
            JSPROP_ENUMERATE)
            QUEUE_EXCEPTIO
            goto err;
    )
    PQfreemem(data);
} else {
    if (!JS_DefineProperty(
        NULL, NULL, JSPROP
        QUEUE_EXCEPTIO
        goto err;
    )
}
```

```
void MyFunc ()
{
while (x == y)
{
    something();
    somethingelse();
}
finalthing();
}
```

```
void MyFunc ()
{
    while (x == y)
    {
        something();
        somethingelse();
    }
}
```

```
while (x == y)
{
    something ();
    somethingelse ();
}
finalthing ();
```



```

/* Unicode freelist & mem
if (unicode_freelist) {
    unicode = unicode_fre
    unicode_freelist = *
    unicode_freelist_size
if (unicode->str) {
    /* Keep-Alive optimiz
    never downsize it
    if ((unicode->length
        unicode_resiz
PyMem_DEL(unicode->st
goto onError;
}
}
else {
    unicode->str = PyMem
}
PyObject_INIT(unicod
}
else {
    unicode = PyObject_N
    if (unicode == NULL)
        return NULL;
    unicode->str = PyMem_NEW
}

if (!unicode->str) {
    PyErr_NoMemory();
    goto onError;
}
/* Initialize the first

```

Tab과 Space

Java를 주로 쓰는 커뮤니티를 제
외하면 대부분 Tab은 8칸 간격!

Tab이 8칸 간격이 아닌 경우에는
emacs태그 또는 vi 태그로 표시

```
-*- tab-width: 4; -*-
```

```
ex: ts=4 sw=4 sts=4
```

```

/* Unicode freelist & mem
if (unicode_freelist) {
    unicode = unicode_fre
    unicode_freelist = *
    unicode_freelist_size
if (unicode->str) {
    /* Keep-Alive opt
    never downsize
    if ((unicode->ler
        unicode_resiz
PyMem_DEL(uni
goto onError;
}
}
else {
    unicode->str = Py
}
PyObject_INIT(unicod
}
else {
    unicode = PyObject_N
    if (unicode == NULL)
        return NULL;
    unicode->str = PyMem
}

if (!unicode->str) {
    PyErr_NoMemory();
    goto onError;
}
/* Initialize the first

```



```
Lucy(perky):~/cvs/python/trunk% wget --help
GNU Wget 1.10.2, a non-interactive network retriever.
Usage: wget [OPTION]... [URL]...
```

Mandatory arguments to long options are mandatory for short options too.

Startup:

-V, --version	display the version of Wget and exit.
-h, --help	print this help.
-b, --background	go to background after startup.
-e, --execute=COMMAND	execute a <code>`.wgetrc'-style</code> command.

Logging and input file:

-o, --output-file=FILE	log messages to FILE.
-a, --append-output=FILE	append messages to FILE.
-d, --debug	print lots of debugging information.
-q, --quiet	quiet (no output).
-v, --verbose	be verbose (this is the default).
-nv, --no-verbose	turn off verbosity, without being quiet.

명령행 인터페이스 스타일

getopt, GNU pop, argparse 등 많은 라이브러리가 존재



GNOME Human Interface Guideline

KDE User Interface Guidelines

The GNOME Usability Project

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Basics

Scope of this document

This document attempts to specify the look-and-feel for KDE applications. The goal is to provide some rules-of-thumb for developers to create their applications interface so that KDE software will have a consistent look-and-feel.

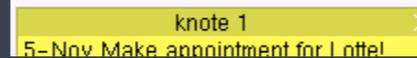
The guidelines in this style guide are only suggestions - they are not set in stone. It is the application designer's duty to create a decent interface. Following rules will not do that, but common sense will.

These guidelines are aimed at a typical application consisting of a menubar, toolbar, working area and statusbar. Not every application necessarily needs to have all these components, but if your application does, then the components should work as described here. Please note that not every component described must be present in your application.

Example

The KNotes program consists solely of a working area. Its interface is such that it resembles the well-known paper Post-It notes of 3M.

Although it doesn't have a menubar or toolbar, the rest of its interface (e.g. dialogs, use of mouse) should still follow these guidelines.



그래픽 인터페이스 스타일

GNOME, KDE, XFCE 등..

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 - ▶ 여유를 갖자
 - ▶ 되도록 감사
 - ▶ 내용의 형식보다 기술적 형식 중요!
- ▶ 의무나 담당이라기보다는 해주는게 좋은 것
- ▶ 각 커뮤니티마다 고유²의 문화적 특색이 있다
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감사합니다!

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