Executable Texts

4S 2007, Montréal, Québec

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2007/10/13

Key Argument

- Usual view
  - Software running end product
    - e.g., Microsoft Word or PowerPoint
- Alternative view
  - Software as document, manuscript, corpus, or text
  - Consumed among communities of programmers
- The Alternative View allows:
  - Uncovering the social roles of these texts
- Method
  - Comparing comments by two sub-communities
    - Linux Open Source Programmers working on the operating system kernel in C
    - Corporate programmers working on a core business application in COBOL

Linguistic Requirements

- How to define a comment…
  - in COBOL (corporate program)

```
00892 *----SET ADDRESS OF MESSAGE MAIN HEADER.                          PRGMNBR1
00893 *                                                                 PRGMNBR1
```

  - in C++ (online programming guide)

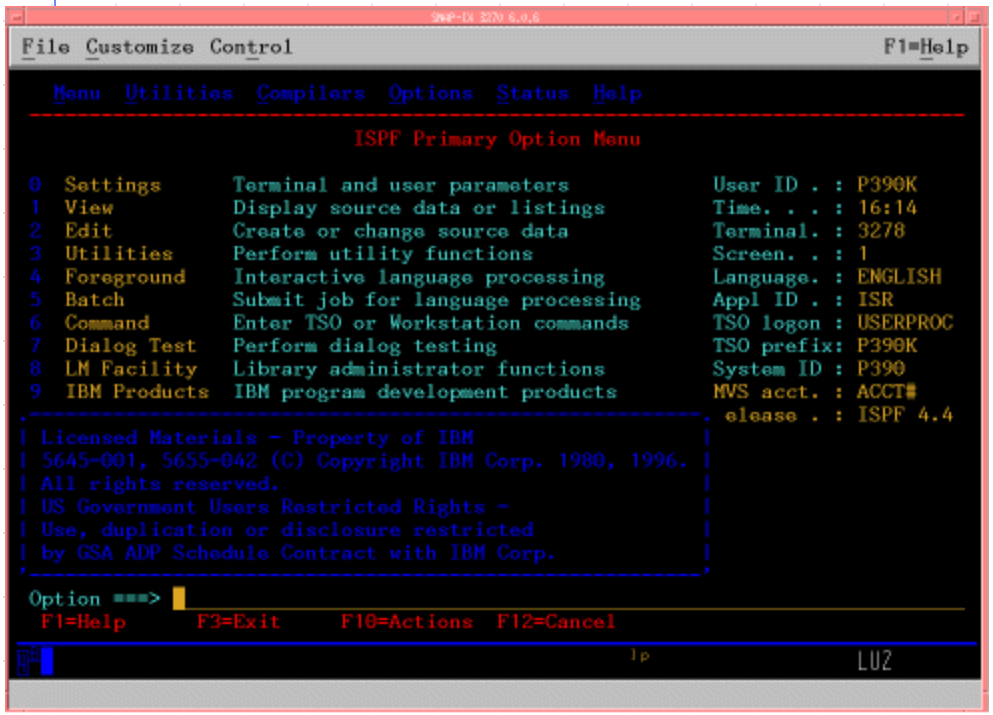
```
//============================================================//
//Development By : Jigar Mehta
//Date : [ & now() & ]
//============================================================//
```

  - in C (Linux kernel)

```
/* Arch-specific enabling code. */
```

Technical Environment

- Different visual constraints



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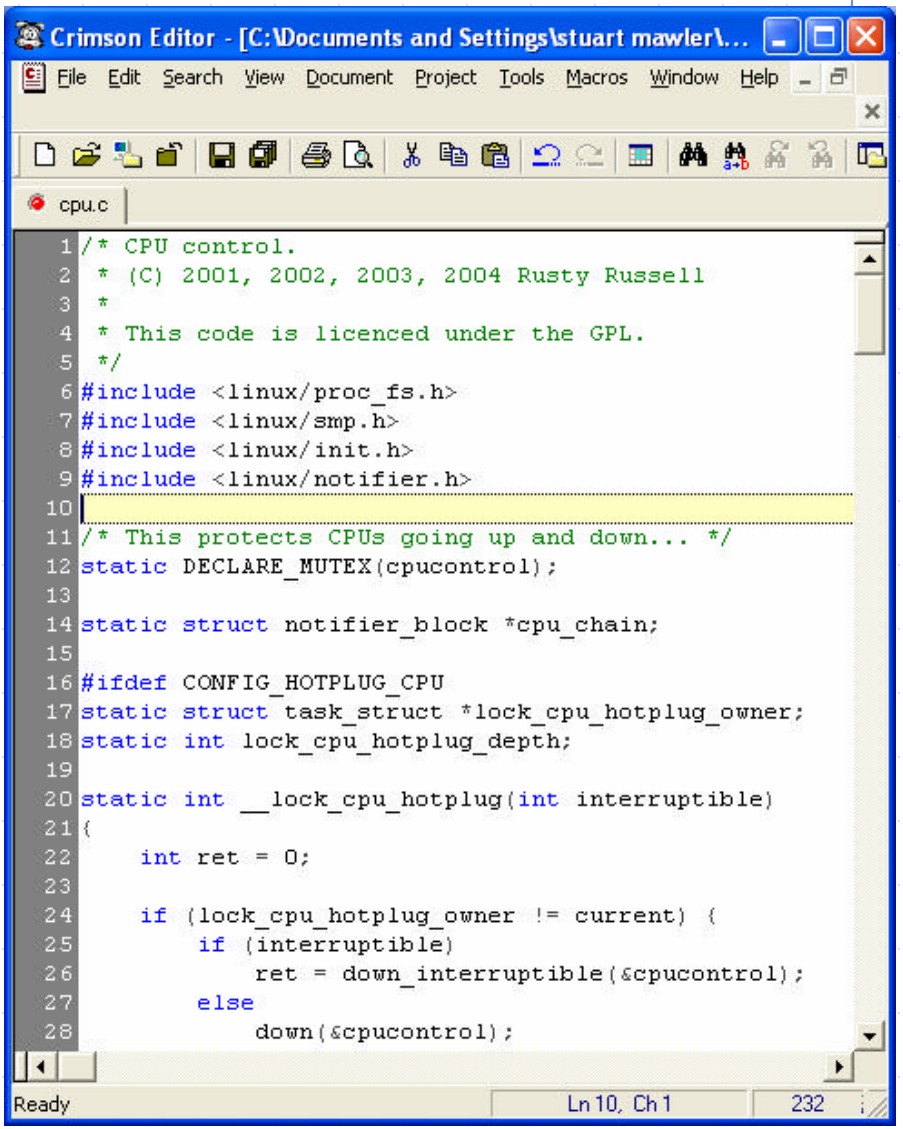
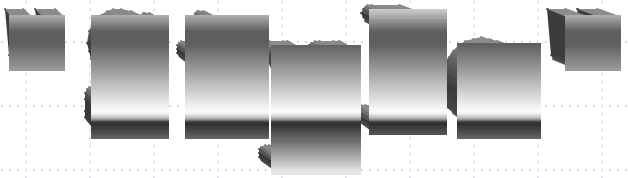


Cultural Constraints and Norms

- Accepted practices
  - Normative purpose for the comment
    - Power structure driving the norms
  - Content
  - Visual Impact



Purpose: Identify "who" & "when"

Power: Developed by a manager

Content: Nothing about the code

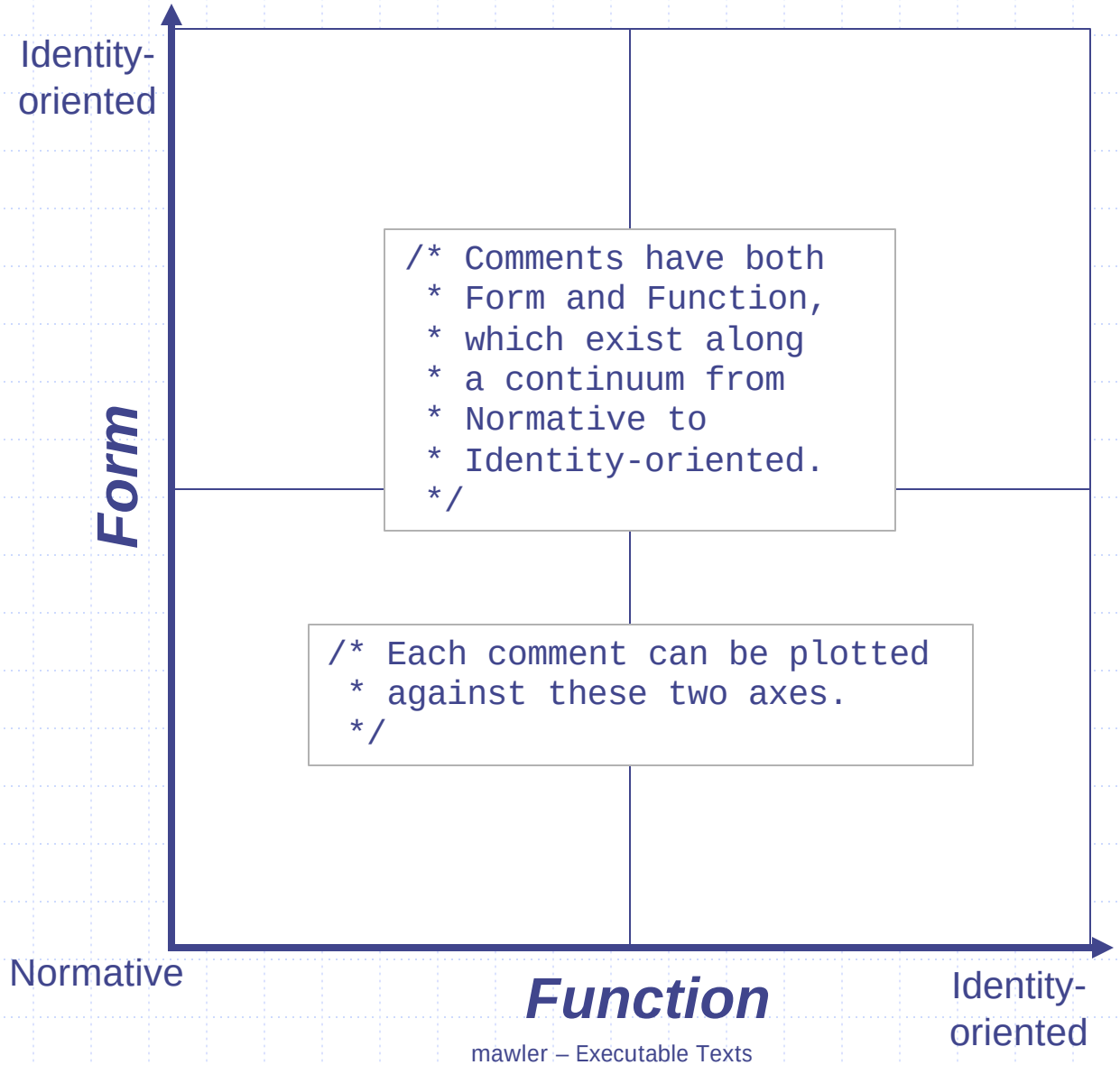
Visual: Easy to see when scanning

```
//=========================================================//
//Development By : Jigar Mehta
//Date : [ & now() & ]
//=========================================================//
```

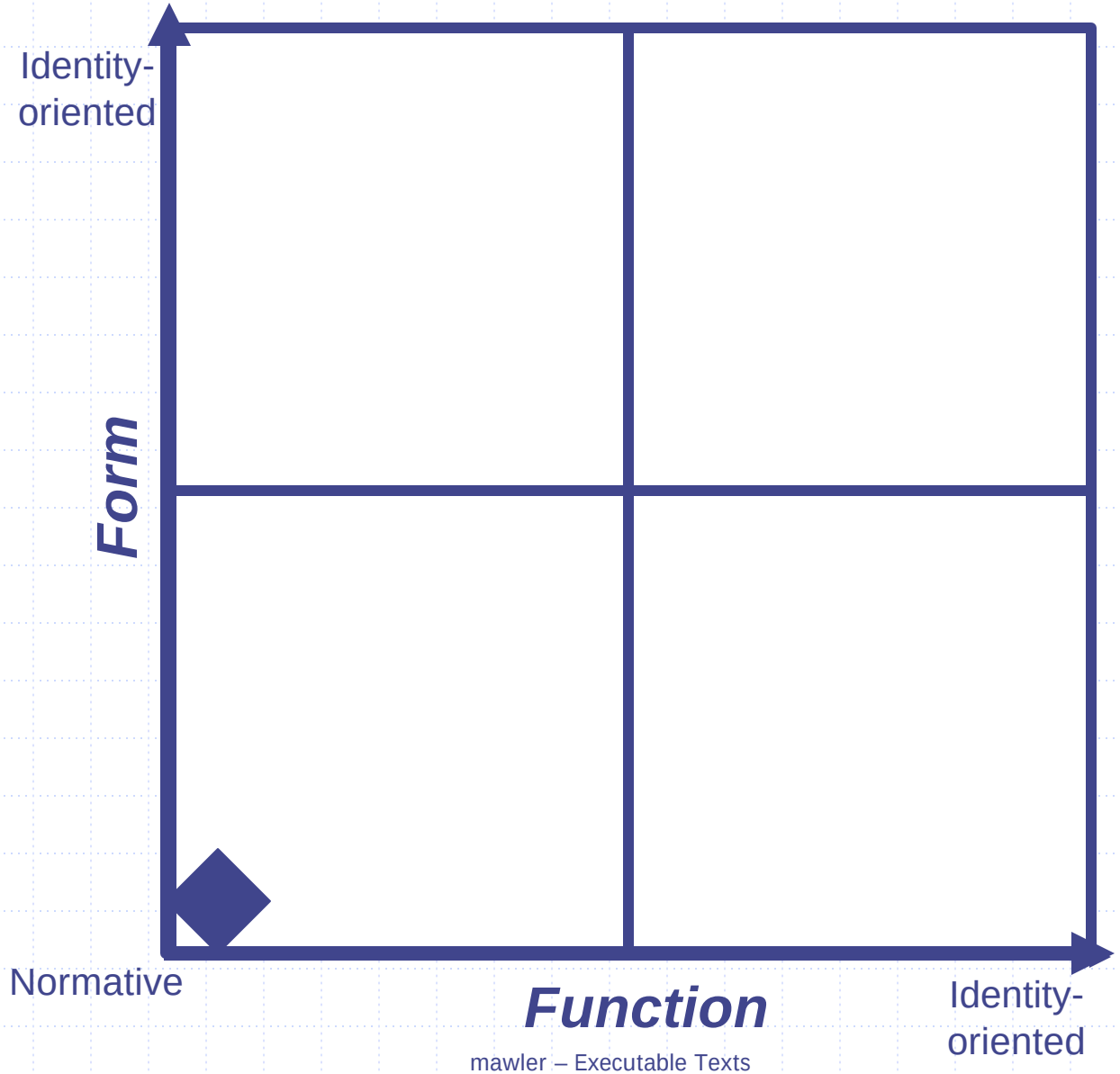
```
/* Arch-specific enabling code. */ (cpu.c)
```

```
#endif /*CONFIG_HOTPLUG_CPU*/ (cpu.c)
```

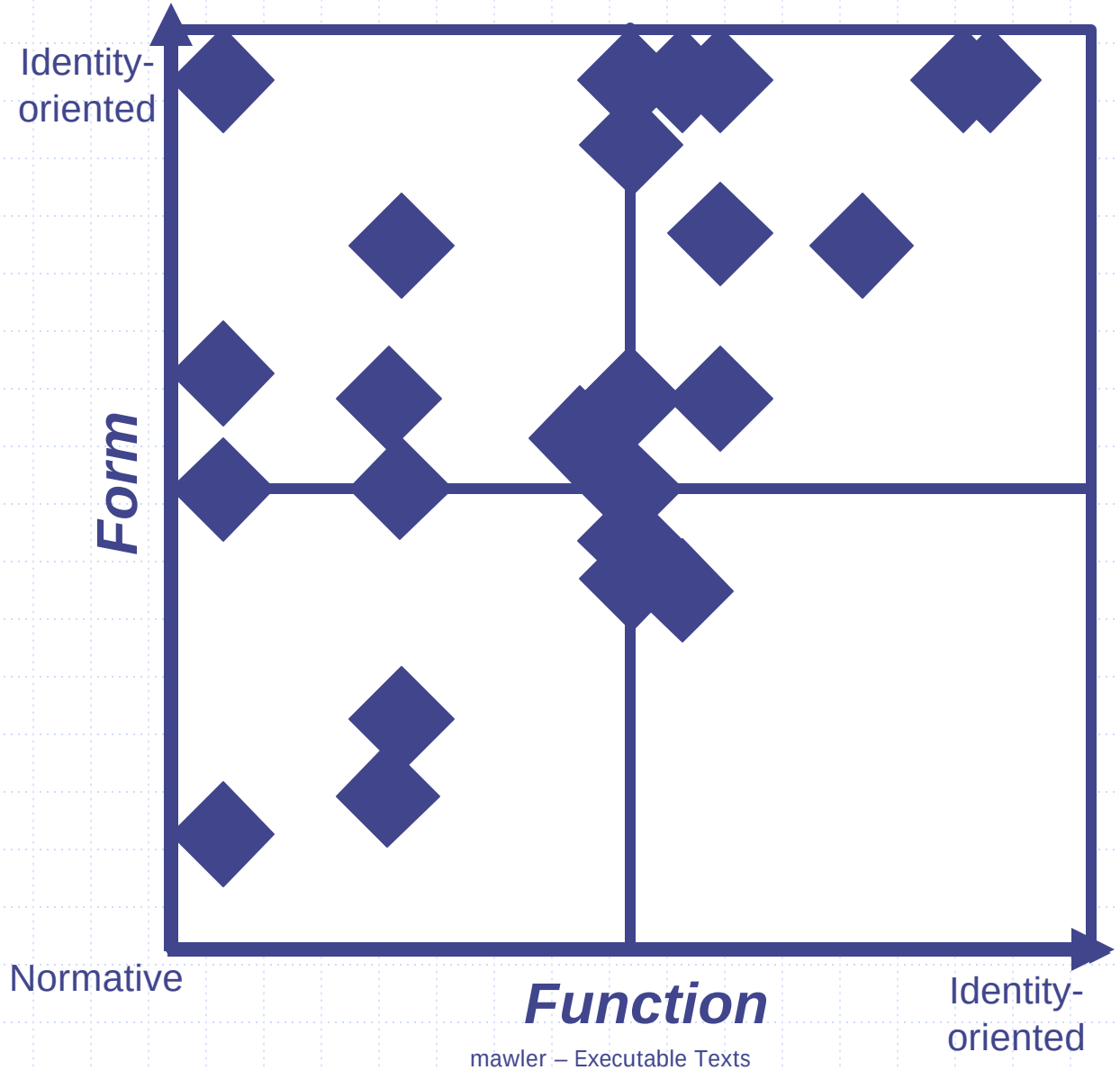
Mapping Code Comments



“Good” Comments



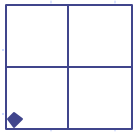
Identity-oriented Comments



Good Comments – One Example

- Corporate Sample

```
01827 *PSR3
01828 *     WHEN SUB PROMO IS PASSED, SET UP PGM TO UPDATE FF INFO IF
01829 *     SUBSEQUENT EDITS ARE COMPLETED ERROR FREE
01830 *         LOGIC TO UPDATE WAS PREVIOUS LOCATED HERE
01831 *         IT HAS BEEN MOVED TO THE 0840 PARAGRAPH
01832 *
```

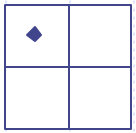


  - Written in COBOL
  - Tells what is happening
  - What has been changed
  - How it was changed
  - Does not tell “who” or “when”
  - Does say “why”, subtly with “PSR3”
    - Shows much context, if you know the context...

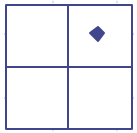
The Texts Speak for Themselves...

- Letting individual personality come through

```
/*
 * Select whether the frequency is to be controlled
 * and in which mode (PLL or FLL). Clamp to the operating
 * range. Ugly multiply/divide should be replaced someday.
 */(time.c)
```



- Allowing comments to act as a “dialog”



```
if (IS_ERR(p)) { /* Should never happen since we send PATH_MAX */
          /* FIXME: can we save some information here? */
          audit_log_format(ab, “<too long>“);
} else
          audit_log_untrustedstring(ab, p);
kfree(path);
}(acct.c)
```

The Texts Speak for Themselves...

- Judging the programming history around one's edit

```
06073 * THAT CONCLUDES THE STRUCTURED COBOL PORTION OF THIS PGM...
06074 * RETURN TO SPAGHETTI CODE!
06075       GO TO 3159-CONTINUE-SPAGHETTI.
```

- Individualism in a limited medium

```
00404 *RTR 8/22/94 \/
00405       05  WS-TRAN-CODE            PIC X(02).
00406 *RTR 8/22/94 /\
```

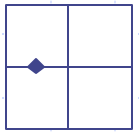
- Taking shots at other programmers

```
02266 * 06/17/96 name      06/26/96    FIXED FOR PRT#960521.05.
[... 5 lines removed ...]
02272 *                                ALSO REMOVED THE CODE THAT
02273 *                                APPEARED TO BE A RESULT OF A
02274 *                                PROGRAMMER GUESSING HOW COBOL
02275 *                                WORKED.  THESE GUESSES CAUSED
02276 *                                WARNINGS WHEN COMPILED,
02277 *                                ADDED UNECESSARY OVERHEAD AND
02278 *                                COMPLEXITY TO THE PROGRAM, AND
02279 *                                OBSCURED THE LOGIC OF THE PGM.
02280 *
```

“We”: Elevating the Discipline

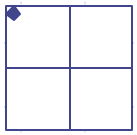
- The “academic” lecture

```
/*
 * If we're in an interrupt or softirq, we're done
 * (this also catches softirq-disabled code). We will
 * actually run the softirq once we return from
 * the irq or softirq.
 *
 * Otherwise we wake up ksoftirqd to make sure we
 * schedule the softirq soon.
 */(softirq.c)
```



“We”: Enforcing Boundaries

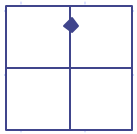
- Boundaries with users



```
/* We only trust the superuser with rebooting the system. */
if (!capable(CAP_SYS_BOOT))
        return -EPERM;

/* For safety, we require “magic” arguments. */
if (magic1 != LINUX_REBOOT_MAGIC1 ||
    (magic2 != LINUX_REBOOT_MAGIC2 &&
                magic2 != LINUX_REBOOT_MAGIC2A &&
                    magic2 != LINUX_REBOOT_MAGIC2B &&
                magic2 != LINUX_REBOOT_MAGIC2C))
        return -EINVAL;(sys.c)
```

- With outsiders

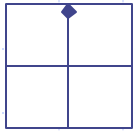


```
/*
 * setuid() is implemented like SysV with SAVED_IDS
 *
 * Note that SAVED_ID's is deficient in that a setuid root program
 * like sendmail, for example, cannot set its uid to be a normal
 * user and then switch back, because if you're root, setuid() sets
 * the saved uid too.  If you don't like this, blame the bright people
 * in the POSIX committee and/or USG.  Note that the BSD-style setreuid()
 * will allow a root program to temporarily drop privileges and be able to
 * regain them by swapping the real and effective uid.
 */(sys.c)
```

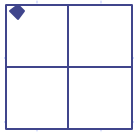
“We”: Linking Programmer & System

- First: Anthropomorphize the System

```
/* Some compilers disobey section attribute on statics when not
   initialized -- RR */(softirq.c)
```



- Then becoming part of the system is “natural”...



```
/*
 * We're trying to get all the cpus to the average_load, so we don't
 * want to push ourselves above the average load, nor do we wish to
 * reduce the max loaded cpu below the average load, as either of these
 * actions would just result in more rebalancing later, and ping-pong
 * tasks around. Thus we look for the minimum possible imbalance.
 * Negative imbalances (*we* are more loaded than anyone else) will
 * be counted as no imbalance for these purposes -- we can't fix that
 * by pulling tasks to us.  Be careful of negative numbers as they'll
 * appear as very large values with unsigned longs.
 */(sched.c)
```

Samples Compared

	Linux kernel:	***Corporate sample***:
Total Files	52	7
Total Lines	41,505	28,304
Lines with Comments	5711	6294
Percentage of Comments to Total Lines	13.75%	22.24%
Lines with “we” Construction	738	36
Percentage of Total Lines with “we”	1.78%	0.13%
Percentage of Comment Lines with “we”	12.92%	0.57%

Conclusion

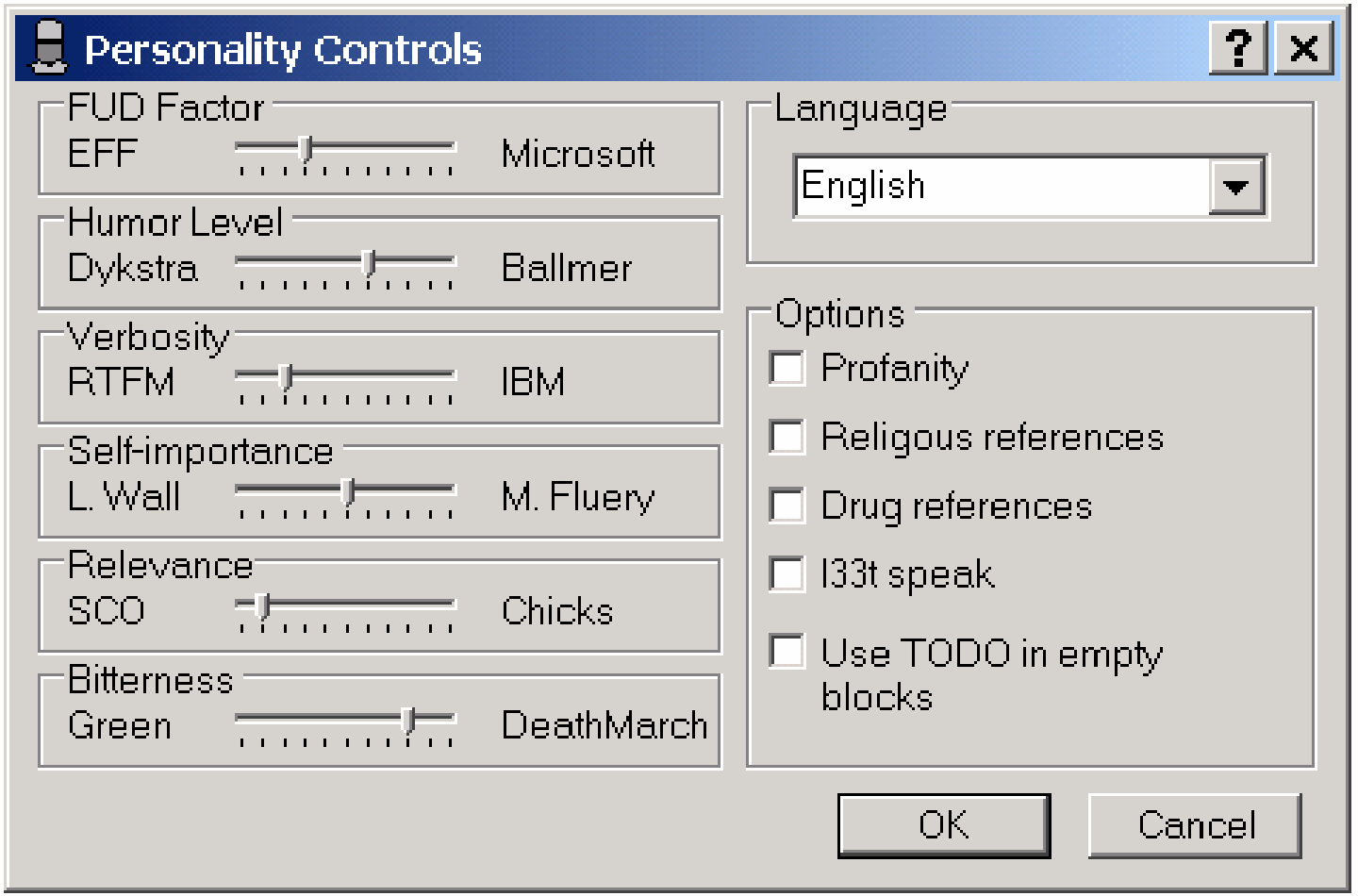
- Comments are both normative & identity-oriented
  - Structure (form & function)

	Linux kernel	***Corporate sample***
Programmer Community	Collegial; Cooperative; Collective	Hierarchical; Judgmental
Association with the Machine	High	“just a job”
Sense of Self	Closely tied to Program	“just a job”

- Commenting is a critical element of
  - Group identity
  - Personal identity
- Pragmatic / business implications
- Future research

A Contrary View

- Does the “We” Construction really indicate collegiality?
  - The Commentator – a satirical faux comment generator



Good Comments

- How to Write Unmaintainable Code
  - Counter-normative
  - Shows how comments "should" be written