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C 言語の OSS Project における Macro 変数利用の調査

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表 1 利用したコンパイル option

| option | 出力内容 | 呼び方 |
|--------|------------------|------------------|
| なし | Clone 後の Project | Original Project |

表 2 Target projects

| id | projectName | summary | commitHash |
|----|-------------------|---|------------------------------|
| 1 | zstd | Compression library (v1.5.1) | 791626dfb92acf4a3d3ba034263 |
| 2 | radare2 | Reverse engineering framework (5.5.4) | 1703da75e247871e6fa22d33085 |
| 3 | nginx | HTTP and reverse proxy server (1.21.5) | 3a7d332aef234d394e5fa2722cc |
| 4 | mimikatz | Windows penetration test tool (2.2.0-20210810-2) | 7f02230226b04591f9685e74b6e |
| 5 | goaccess | Real-time web log analyzer (v1.5.4) | 72876319542c2575a05627ab6b9 |
| 6 | micropython | Programming language interpreter (v1.17) | 7c54b6428058a236b8a48c93c25 |
| 7 | bcc | BPF (Berkeley Package Filter) creation tool (v0.23.0) | 67f59ee80fcf5deedaacba1436d5 |
| 8 | Nuklear | Cross-platform GUI library (4.9.5) | 3e91905e82c3cad01435d4a8a6c |
| 9 | nnn | Terminal file manager (v4.4) | 65eddf7b9f02f685145005a8ff |
| 10 | timescaledb | Time-series SQL database (2.5.1) | a2530ab5f251ba9680d2c27049c |
| 11 | hashcat | Password recovery utility (6.2.5) | fe1d3f95bb1d3235e8973bd95f9 |
| 12 | nginx-rtmp-module | nginx media streaming server module (v1.2.2) | 23e1873aa62acb58b7881eed2a5 |
| 13 | qmkFirmware | Keyboard firmware (0.15.13) | 7c186ebb974b4bbadbb74a7610f |
| 14 | tengine | Web server (extended from nginx) (2.3.3) | ae3ff4619d133ff15d6dad4b8fab |
| 15 | twemproxy | KVS proxy (0.5.0) | 894d78378c0720642184e5bbfcb |
| 16 | ish | iOS Linux shell (1.2.3) | f5dabd67f6bb46f93b4c591a9fb |
| 17 | skynet | Online game framework (v1.5.0) | 38e5b1ca1ca4c0ea37df17984f4 |
| 18 | robotjs | Desktop automation library (v0.6.0) | 99021d82cea1fe15f6a3cc1ae0c |
| 19 | brothli | Compression library (v1.0.9) | e61745a6b7add50d380cfd7d388 |
| 20 | tig | Text-mode git interface (2.5.5) | 72187884af29085691698868ff2 |
| 21 | kcp | Protocol implementation (1.7) | 38e0c9366e4a72c749ff0bcd9f1 |
| 22 | reactos | Operating system (0.4.14) | 9963bba88bdca8516369b9814a |
| 23 | openwrt | Operating system (v21.02.1) | b4d7885af70a42df7577157b96f |

表 3 Target project files

| projectName | cFiles | hFiles | allFiles | targetRate |
|-------------|--------|--------|----------|---------------------|
| radare2 | 1257 | 631 | 4445 | 0.4247469066366704 |
| ish | 108 | 108 | 461 | 0.4685466377440347 |
| goaccess | 35 | 35 | 119 | 0.5882352941176471 |
| brotli | 33 | 60 | 369 | 0.25203252032520324 |
| nnn | 2 | 8 | 113 | 0.08849557522123894 |
| nginx | 230 | 113 | 499 | 0.687374749498998 |

表 4 C file loc

| projectName | sum | fileNum | average |
|-------------|--------|---------|--------------------|
| radare2 | 730700 | 1257 | 581.304693715195 |
| ish | 24033 | 108 | 222.52777777777777 |
| goaccess | 31494 | 35 | 899.8285714285714 |
| brotli | 21035 | 33 | 637.4242424242424 |
| nnn | 8843 | 2 | 4421.5 |
| nginx | 190635 | 230 | 828.8478260869565 |

表 5 s per files

| fileId | id | macroCnt | name | path | pr |
|--------|------|----------|------------------------|--|----|
| 2664 | 1704 | 1704 | sqlite3.c | project/mimikatz/modules/sqlite3.c | |
| 648 | 510 | 510 | riscvopc.c | project/radare2/libr/asm/arch/riscv/riscvopc.c | |
| 1035 | 396 | 396 | elf.c | project/radare2/libr/bin/format/elf/elf.c | |
| 936 | 324 | 324 | dwarf.c | project/radare2/libr/bin/dwarf.c | |
| 4744 | 263 | 263 | nnn.c | project/nnn/src/nnn.c | |
| 577 | 175 | 175 | mipsdis.c | project/radare2/libr/asm/arch/mips/gnu/mipsdis.c | |
| 1568 | 160 | 160 | dwarf_process.c | project/radare2/libr/anal/dwarf_process.c | |
| 2268 | 134 | 134 | ngx_http_upstream.c | project/nginx/src/http/ngx_http_upstream.c | |
| 581 | 134 | 134 | tricoredis.c | project/radare2/libr/asm/arch/tricore/gnu/tricoredis.c | |
| 2267 | 132 | 132 | ngx_http_core_module.c | project/nginx/src/http/ngx_http_core_module.c | |
| 1157 | 116 | 116 | apprentice.c | project/radare2/libr/magic/apprentice.c | |
| 946 | 114 | 114 | pe.c | project/radare2/libr/bin/format/pe/pe.c | |
| 1380 | 111 | 111 | tccgen.c | project/radare2/libr/parse/c/tccgen.c | |
| 448 | 107 | 107 | xtensamodules.c | project/radare2/libr/asm/arch/xtensa/gnu/xtensamodules.c | |
| 1581 | 106 | 106 | flirt.c | project/radare2/libr/anal/flirt.c | |
| 2699 | 97 | 97 | sqlite3.h | project/mimikatz/modules/sqlite3.h | |
| 23455 | 96 | 96 | tty.c | project/ish/fs/tty.c | |
| 822 | 95 | 95 | core_java.c | project/radare2/libr/core/p/core_java.c | |
| 552 | 93 | 93 | ppcopc.c | project/radare2/libr/asm/arch/ppc/gnu/ppcopc.c | |
| 23484 | 90 | 90 | errno.c | project/ish/kernel/errno.c | |

表 6 available macro count per files

| fileId | id | macroCnt | name | path |
|--------|-------|----------|------------------------|--|
| 2454 | 15806 | 15806 | ngx_event_openssl.h | project/nginx/src/event/ngx_event_openssl.h |
| 2340 | 15067 | 15067 | ngx_http_perl_module.c | project/nginx/src/http/modules/perl/ngx_http_perl_module.c |
| 2341 | 15065 | 15065 | ngx_http_perl_module.h | project/nginx/src/http/modules/perl/ngx_http_perl_module.h |
| 1684 | 9308 | 9308 | debug_native.c | project/radare2/libr/debug/p/debug_native.c |
| 1734 | 9028 | 9028 | xnu_debug.c | project/radare2/libr/debug/p/native/xnu/xnu_debug.c |
| 1132 | 8139 | 8139 | bin_write_elf64.c | project/radare2/libr/bin/p/bin_write_elf64.c |
| 1113 | 8138 | 8138 | bin_write_elf.c | project/radare2/libr/bin/p/bin_write_elf.c |
| 1033 | 8138 | 8138 | elf64.c | project/radare2/libr/bin/format/elf/elf64.c |
| 1035 | 8137 | 8137 | elf.c | project/radare2/libr/bin/format/elf/elf.c |
| 1084 | 8134 | 8134 | bin_elf64.c | project/radare2/libr/bin/p/bin_elf64.c |
| 1128 | 8133 | 8133 | bin_elf.c | project/radare2/libr/bin/p/bin_elf.c |
| 1088 | 8133 | 8133 | bin_cgc.c | project/radare2/libr/bin/p/bin_cgc.c |
| 1028 | 8110 | 8110 | elf64_write.c | project/radare2/libr/bin/format/elf/elf64_write.c |
| 1034 | 8109 | 8109 | elf_write.c | project/radare2/libr/bin/format/elf/elf_write.c |
| 772 | 7976 | 7976 | rtr.c | project/radare2/libr/core/rtr.c |
| 1424 | 7833 | 7833 | io_debug.c | project/radare2/libr/io/p/io_debug.c |
| 2664 | 7187 | 7187 | sqlite3.c | project/mimikatz/modules/sqlite3.c |
| 786 | 7169 | 7169 | cmd.c | project/radare2/libr/core/cmd.c |
| 818 | 7109 | 7109 | cmd_debug.c | project/radare2/libr/core/cmd_debug.c |
| 690 | 6692 | 6692 | asm_mips_gnu.c | project/radare2/libr/asm/p/asm_mips_gnu.c |