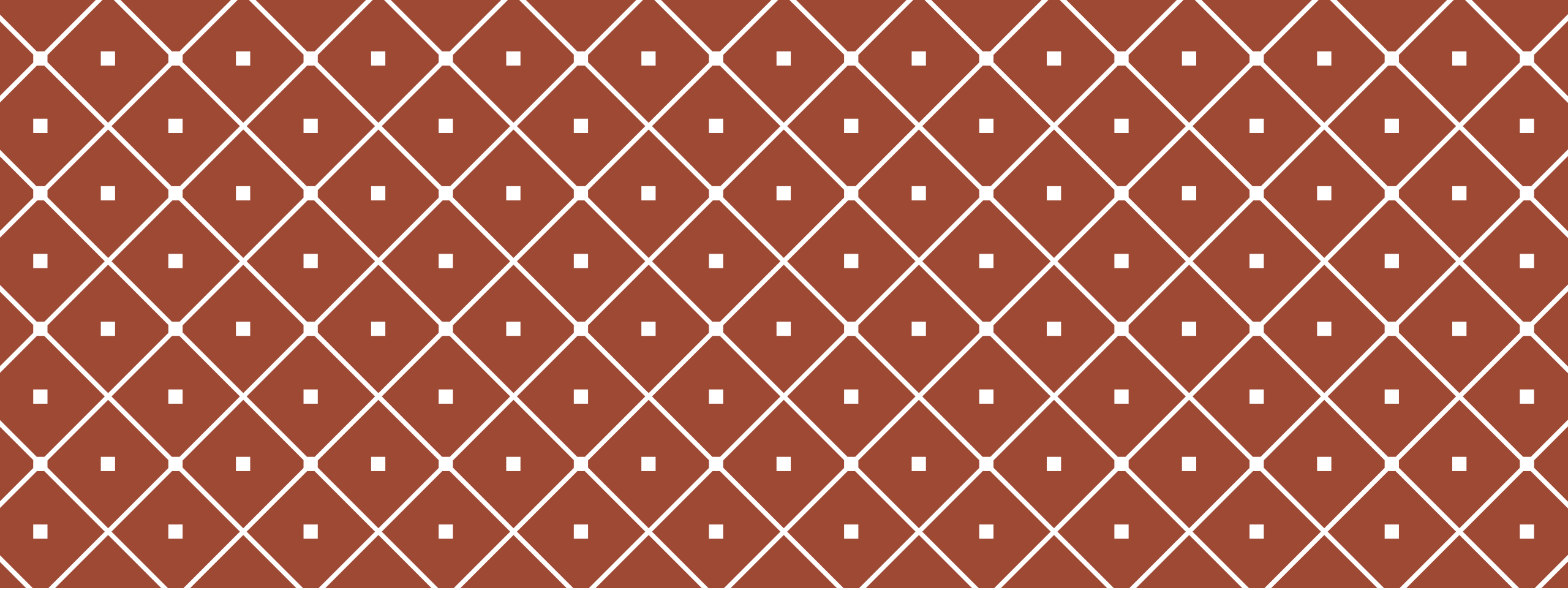

OPEN SOURCE DEV LAB

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PROJECT DESCRIPTION

KMOD – Linux userspace module utilities:

- lsmod, modinfo, depmod, insmod, rmmod, weak-modules
- Add an option to print out nicely formatted symbol-level dependencies

Intended to help during kernel module development

LINUX MODULES IN 1 MINUTE

```
int init_module(void *module_image, unsigned long len, const char *param_values);
int finit_module(int fd, const char *param_values, int flags);
```

module_name is an elf image.
Kernel contains runtime linker.
Module directory layout, precedence, order is defined by userspace.
Module dependencies, symbols versions, keys, params, etc set at compile time.

See:
/proc/modules
/sys/module/*

THE WORK

Some time reading kmod code: “OO” C, clean.

- Modified depmod vs making separate utility
- Had to modify internal structs to keep more info around.

THE WORK

```
computee@ap:~/scm/kmod$ ./tools/depmod -h
Usage:
        depmod -[aA] [options] [forced_version]
        depmod -v [forced_version] modulename

If no arguments (except options) are given, "depmod -a" is assumed

depmod will output a dependency list suitable for the modprobe utility.

Options:
        -a, --all               Probe all modules
        -A, --quick             Only does the work if there's a new module
        -e, --errsyms           Report not supplied symbols
        -n, --show              Write the dependency file on stdout only
        -P, --symbol-prefix     Architecture symbol prefix
        -C, --config=PATH       Read configuration from PATH
        -v, --verbose           Enable verbose mode
        -d, --debug=TYPE        Display debugging output (all,reverse,builtin)
        -w, --warn              Warn on duplicates
        -V, --version           show version
        -h, --help              show this help

The following options are useful for people managing distributions:
        -b, --basedir=DIR       Use an image of a module tree.
        -F, --filesyms=FILE     Use the file instead of the
                                current kernel symbols.
        -E, --symvers=FILE      Use Module.symvers file to check
                                symbol versions.
computee@ap:~/scm/kmod$
```

THE WORK

```
computee@ap:~/scm/kmod$ ./tools/depmod -dall | head -30
cnic:
    __uio_register_device                (0xf3b32e48) U uio
    uio_event_notify                     (0xa916846d) U uio
    uio_unregister_device                (0x941a95cb) U uio
fb_s6d02a1:
    fbtft_remove_common                  (0x2620bcc3) U fbtft
    fbtft_probe_common                   (0xed18f6b1) U fbtft
fintek_cir:
    ir_raw_event_handle                  (0xd8714aef) U rc_core
    ir_raw_event_store                   (0x45e0237b) U rc_core
    rc_register_device                   (0x723ea718) U rc_core
    rc_free_device                       (0x70faeafd) U rc_core
    rc_allocate_device                   (0x9d9127cf) U rc_core
    ir_raw_event_store_with_filter       (0xcae23061) U rc_core
    rc_unregister_device                 (0x662f5e7b) U rc_core
nfcmrvl_uart:
    nci_uart_register                    (0x66275348) U nci_uart
    nci_uart_unregister                  (0x47ca5970) U nci_uart
    nfcmrvl_nci_register_dev             (0xaa12b2dc) U nfcmrvl
    nci_uart_set_config                  (0xdf262ff4) U nci_uart
    nfcmrvl_nci_recv_frame               (0x89b245fb) U nfcmrvl
    nfcmrvl_nci_unregister_dev           (0x46972a1b) U nfcmrvl
saa6752hs:
    v4l2_i2c_subdev_init                 (0xba87d9bb) U v4l2_common
    v4l2_ctrl_handler_init_class         (0x1c70747b) U videodev
    v4l2_ctrl_handler_setup              (0xb575db7e) U videodev
    v4l2_device_unregister_subdev        (0xe56bb45d) U videodev
    v4l2_ctrl_new_std_menu               (0x49aec2dd) U videodev
    v4l2_ctrl_activate                   (0x63f18879) U videodev
    v4l2_ctrl_new_std                    (0xda5231c3) U videodev
```

THE WORK

```
computee@ap:~/scm/kmod$ ./tools/depmod -dbuiltin | head -30
arc4:
    blkcipher_walk_done                 (0x879f9c8b) U 4.4.0-87-generic
    blkcipher_walk_virt                 (0x8a5916da) U 4.4.0-87-generic
    crypto_register_algs                (0xca33d45c) U 4.4.0-87-generic
    __fentry__                          (0xbdfb6dbb) U 4.4.0-87-generic
    __stack_chk_fail                    (0xdb7305a1) U 4.4.0-87-generic
    crypto_blkcipher_type               (0x7c9a79ae) U 4.4.0-87-generic
    crypto_unregister_algs              (0xb7fc97bc) U 4.4.0-87-generic
    module_layout                       (0xa2f7d132) U 4.4.0-87-generic
cnic:
    free_irq                            (0xf20dabd8) U 4.4.0-87-generic
    dma_ops                             (0x6682f090) U 4.4.0-87-generic
    rtnl_unlock                         (0x6e720ff2) U 4.4.0-87-generic
    __ipv6_addr_type                    (0xd542439) U 4.4.0-87-generic
    pci_dev_put                         (0x4f813c52) U 4.4.0-87-generic
    __uio_register_device               (0xf3b32e48) U uio
    finish_wait                         (0xf08242c2) U 4.4.0-87-generic
    kfree                               (0x37a0cba) U 4.4.0-87-generic
    prepare_to_wait_event               (0x2207a57f) U 4.4.0-87-generic
    netdev_warn                         (0xa52d9991) U 4.4.0-87-generic
    __wake_up                           (0xa6bbd805) U 4.4.0-87-generic
    ip_route_output_flow                (0x916fb6ba) U 4.4.0-87-generic
    _raw_spin_lock                      (0xe259ae9e) U 4.4.0-87-generic
    kmem_cache_alloc_trace              (0x85d4c68) U 4.4.0-87-generic
    netdev_err                          (0x371fb428) U 4.4.0-87-generic
    __fentry__                          (0xbdfb6dbb) U 4.4.0-87-generic
    kmalloc_order_trace                 (0xa202a8e5) U 4.4.0-87-generic
    schedule_timeout                    (0xd62c833f) U 4.4.0-87-generic
    __stack_chk_fail                    (0xdb7305a1) U 4.4.0-87-generic
    queue_delayed_work_on               (0x70cd1f) U 4.4.0-87-generic
```

THE WORK

```
computee@ap:~/scm/kmod$ ./tools/depmod -dreverse | head -30
cnic:
    cnic_register_driver                (0x5254ec31) bnx2fc bnx2i
    cnic_unregister_driver              (0x636af174) bnx2fc bnx2i
st_drv:
    st_register                         (0x611799db) nfcwilink fm_drv btwilink
    st_unregister                       (0xe73dfb4f) nfcwilink fm_drv btwilink
cfag12864b:
    cfag12864b_buffer                   (0xc48e9d95) cfag12864bfb
    cfag12864b_isinited                 (0x2ff9464) cfag12864bfb
    cfag12864b_getrate                  (0x9522a342)
    cfag12864b_disable                  (0xecb2e5d) cfag12864bfb
    cfag12864b_isenabled                (0x305dc3c6)
    cfag12864b_enable                   (0x3389f926) cfag12864bfb
ath9k_hw:
    ath9k_hw_set_txq_props              (0x263c761a) ath9k ath9k_htc
    ath9k_hw_process_rxdesc_edma        (0x259d00f2) ath9k
    ath9k_hw_cfg_gpio_input             (0x1d9ac77) ath9k
    ath9k_hw_getchan_noise              (0x29735031) ath9k ath9k_common
    ath9k_hw_init_global_settings       (0xae778a6b) ath9k ath9k_htc
    ath9k_hw_init                       (0x5cc5a4c) ath9k ath9k_htc
    ath9k_hw_bstuck_nfcal               (0xf7189d84) ath9k
    ath9k_hw_setantenna                 (0x5d4bc743) ath9k
    ar9003_paprd_init_table             (0x8d82aefd) ath9k
    ath9k_hw_phy_disable                (0xe4b636e8) ath9k ath9k_htc
    ar9003_paprd_enable                 (0x7e2dcf35) ath9k
    ath9k_hw_beaconq_setup              (0xc35bad2d) ath9k ath9k_htc
    ath9k_hw_intrpend                   (0x2df5be6) ath9k
    ath9k_hw_reset_calvalid             (0x353e8eb9) ath9k ath9k_htc
    ath9k_hw_addrxbuf_edma              (0xd886b70b) ath9k
    ath9k_hw_txstart                    (0xb6064f23) ath9k
computee@ap:~/scm/kmod$
```

STILL CAN BE DONE

* Only allocate list when -d options are given
* Smarter, size-aware display
* Fix how depmod processes cmd line?
* Man page / docs

TRIP TO NEW RELIC

https://www.habitat.sh/ “Automate any app, anywhere with Habitat”

Presentation by program manager, 1+ hours, mostly high level.

System to deploy/manage apps onto virtual machines, bare metal machines, cloud (Amazon, etc).

Does many things: build env, packaging format, health monitor.

CONCLUSION

Fun project, could have been more work.

Learned some new stuff.