Static Analysis at Red Hat

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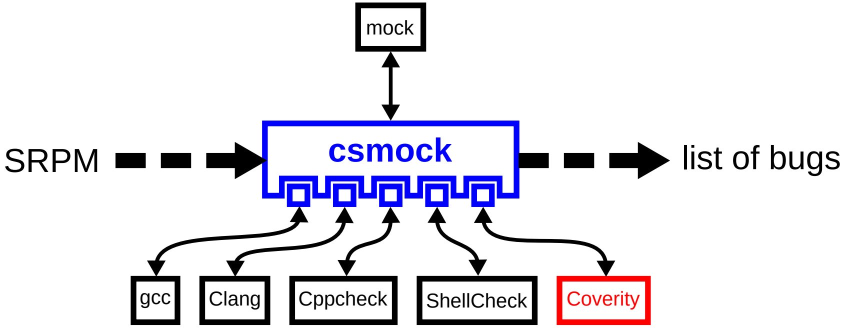
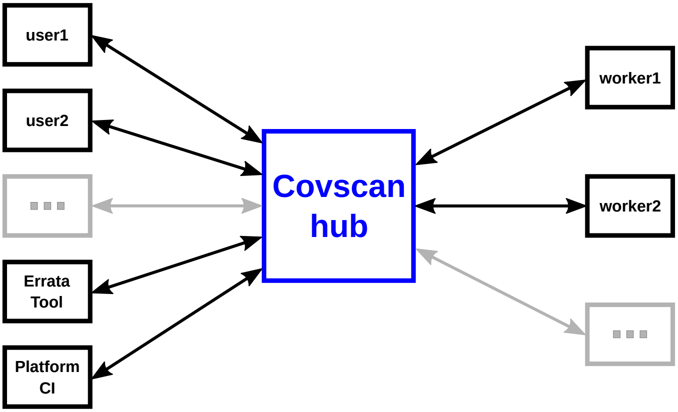
csmock

- command-line utility that runs static analyzers
- one interface, one output format, plug-in API
- fully open-source, available in Fedora/CentOS



Covscan

- Red Hat's internal service that runs csmock



RHEL-8 Beta static analysis mass scan

- RHEL-8 Beta static analysis mass scan in July 2018
- analyzed 318 million LoC (Lines of Code) in 3390 packages
- 95% packages scanned successfully
- 53% packages with at least one potential bug detected
- approx. 370 000 potential bugs detected in total
- approx. one potential bug per 1000 LoC

csmock – output format

```
Error: RESOURCE_LEAK (CWE-772):
src/fptr.c:450: alloc_fn: Storage is returned from allocation function "calloc".
src/fptr.c:450: var_assign: Assigning: "e" = storage returned from "calloc(24UL, 1UL)".
src/fptr.c:450: overwrite_var: Overwriting "e" in "e = calloc(24UL, 1UL)" leaks the storage that "e" points to.
#  448|       if ((f = (struct opd_fptr *) l->u.refp[i]->ent)->ent == NULL)
#  449|         {
#  450|->       e = calloc (sizeof (struct opd_ent), 1);
#  451|         if (e == NULL)
#  452|           {

Error: CPPCHECK_WARNING (CWE-401):
src/fptr.c:464: error[memleak]: Memory leak: e
#  462|         }
#  463|
#  464|->   return ret;
#  465|   }

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src/fptr.c:464: leaked_storage: Variable "e" going out of scope leaks the storage it points to.
#  462|         }
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#  464|->   return ret;
#  465|   }
```
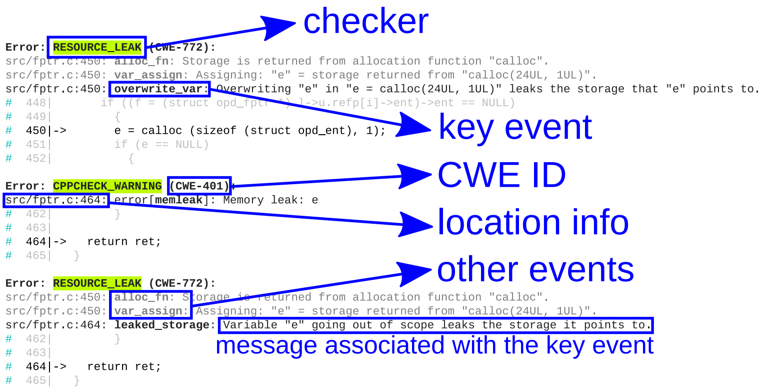

csmock – output format



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csmock – output format (trace events)

```
Error: RESOURCE_LEAK (CWE-772):
src/fptr.c:447: cond_true: Condition "i < l->nrefs", taking true branch.
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src/fptr.c:450: alloc_fn: Storage is returned from allocation function "calloc".
src/fptr.c:450: var_assign: Assigning: "e" = storage returned from "calloc(24UL, 1UL)".
src/fptr.c:451: cond_false: Condition "e == NULL", taking false branch.
src/fptr.c:456: if_end: End of if statement.
src/fptr.c:462: loop: Jumping back to the beginning of the loop.
src/fptr.c:447: loop_begin: Jumped back to beginning of loop.
src/fptr.c:447: cond_true: Condition "i < l->nrefs", taking true branch.
src/fptr.c:448: cond_true: Condition "(f = (struct opd_fptr *)l->u.refp[i]->ent)->ent == NULL", taking true branch.
src/fptr.c:450: overwrite_var: Overwriting "e" in "e = calloc(24UL, 1UL)" leaks the storage that "e" points to.
#  448|      if ((f = (struct opd_fptr *) l->u.refp[i]->ent)->ent == NULL)
#  449|        {
#  450|->        e = calloc (sizeof (struct opd_ent), 1);
#  451|        if (e == NULL)
#  452|          {
```

Example of a fix

```
--- a/src/fptr.c
+++ b/src/fptr.c
@@ -438,28 +438,29 @@
 GElf_Addr
 opd_size (struct prelink_info *info, GElf_Word entsize)
 {
   struct opd_lib *l = info->ent->opd;
   int i;
   GElf_Addr ret = 0;
   struct opd_ent *e;
   struct opd_fptr *f;

   for (i = 0; i < l->nrefs; ++i)
     if ((f = (struct opd_fptr *) l->u.refp[i]->ent)->ent == NULL)
       {
        e = calloc (sizeof (struct opd_ent), 1);
        if (e == NULL)
          {
            error (0, ENOMEM, "%s: Could not create OPD table",
                   info->ent->filename);
            return -1;
          }

        e->val = f->val;
        e->gp = f->gp;
        e->opd = ret | OPD_ENT_NEW;
+       f->ent = e;
        ret += entsize;
       }

   return ret;
 }
```