Licence Informatique 2ème année
Outils de Programmation
TD2- Debogage - Exemple de debogage

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Exemple programme qui initialise le contenu d'un tableau et qui l'affiche

On exécute la compilation et on obtient une erreur.
Débogons :
on relance la compilation avec l'option -g
on lance le debogage
on place par exemple un point d'arrêt sur la fonction main
on examine le contenu de la variable $taille_tab$
$onvrifiequetaille_tabprendlavaleur14$

Exemple programme triinsert

On exécute la compilation et on obtient une erreur de résultat du tri.
Débogons :
On relance la compilation avec l'option -g avec un tableau réduit à 3 entrées (1,3,0)
On lance le debogage
On place un point d'arrêt sur la fonction tri_insertion et on observe le contenu des variables i, j, tab[j] avec la fonction display
On commence ...

- On observe à la première itération i=1,j=1 l'initialisation de tab [j] à 3 et on continue ...(Figure 1) (Figure 2)
- On vérifie i=2 : j=1, tab [j] =3 et j=2, tab[j] =0 Figure (3) (Figure 4)

— on continue ...on vérifie i=2 : j=1, tab[j]=3 et j=0, tab[j]=1 (Figure 5)
— on termine ...i=3, j=0, tab[j] =0 et tableau résultat = 0,0,0 (Figure 6)

On voit qu'il y a un problème ligne 27 avec tab[j]=tab[j+1] qu'il faut corriger : tab[j]=tab[j-1]

```
anoat:tri piau$ lldb trii
(lldb) target create "trii"
Current executable set to 'trii' (x86_64).
(lldb) b tri_insertion
Breakpoint 1: where = trii`tri_insertion + 11 at triinsert.c:24:12, address = 0x0000000100000d6b
(lldb) run
Process 81584 launched: '/Users/piau/Documents/ProgC/TD2/tri/trii' (x86_64)
avant le tri : 1 3 0
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = breakpoint 1.1
    frame #0: 0x0000000100000d6b trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:24:12
   21   void tri_insertion(int tab[], int taille)
   22   {
   23       int i, j;
-> 24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
Target 0: (trii) stopped.
(lldb) display i
Stop hook #1 added.
(lldb) display j
Stop hook #2 added.
(lldb) display tab[j]
Stop hook #3 added.
(lldb) n

- Hook 1 (expr -- i)
(int) $0 = 1


- Hook 2 (expr -- j)
(int) $1 = 32766


- Hook 3 (expr -- tab[j])
error: Aborting reading of commands after command #0: 'expr -- tab[j]' failed with error: Couldn't apply expression side
effects : Couldn't dematerialize a result variable: couldn't read its memory
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000d7e trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:25:20
   22   {
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
-> 25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
Target 0: (trii) stopped.
```

FIGURE 1 – debogage triinsert.c

```
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000d8c trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:26:18
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
-> 26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $3 = 1


- Hook 2 (expr -- j)
(int) $4 = 1


- Hook 3 (expr -- tab[j])
(int) $5 = 3

Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000df7 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:28:18
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
-> 28           tab[j] = elem;
   29       }
   30   }
   31
Target 0: (trii) stopped.
```

FIGURE 2 – debogage triinsert.c

```
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000e05 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:24:30
   21   void tri_insertion(int tab[], int taille)
   22   {
   23       int i, j;
-> 24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $6 = 2


- Hook 2 (expr -- j)
(int) $7 = 1


- Hook 3 (expr -- tab[j])
(int) $8 = 3

Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000d7e trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:25:20
   22   {
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
-> 25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
Target 0: (trii) stopped.
```

FIGURE 3 – debogage triinsert.c

```
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000d8c trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:26:18
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
-> 26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $9 = 2


- Hook 2 (expr -- j)
(int) $10 = 2


- Hook 3 (expr -- tab[j])
(int) $11 = 0

Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000dce trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:27:22
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
-> 27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
   30   }
Target 0: (trii) stopped.
```

FIGURE 4 – debogage triinsert.c

```
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000de9 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:26:47
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
-> 26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $12 = 2


- Hook 2 (expr -- j)
(int) $13 = 1


- Hook 3 (expr -- tab[j])
(int) $14 = 3

Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000dce trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:27:22
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
-> 27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
   30   }
Target 0: (trii) stopped.
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000de9 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:26:47
   23       int i, j;
   24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
-> 26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $15 = 2


- Hook 2 (expr -- j)
(int) $16 = 0


- Hook 3 (expr -- tab[j])
(int) $17 = 1

Process 81584 stopped
```

FIGURE 5 – debogage triinsert.c

```
(lldb) n
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000e05 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:24:30
   21   void tri_insertion(int tab[], int taille)
   22   {
   23       int i, j;
-> 24       for (i = 1; i < taille; i++) {
   25           int elem = tab[i];
   26           for (j = i; j > 0 && tab[j-1] > elem; --j)
   27               tab[j] = tab[j+1];
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $18 = 3


- Hook 2 (expr -- j)
(int) $19 = 0


- Hook 3 (expr -- tab[j])
(int) $20 = 0

Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000e13 trii`tri_insertion(tab=0x00007ffeefbffa00, taille=3) at triinsert.c:30:1
   27               tab[j] = tab[j+1];
   28           tab[j] = elem;
   29       }
-> 30   }
   31
   32   int main(void)
   33   {
Target 0: (trii) stopped.
(lldb) n

- Hook 1 (expr -- i)
(int) $21 = 3


- Hook 2 (expr -- j)

- Hook 3 (expr -- tab[j])
error: Aborting reading of commands after command #0: 'expr -- j' failed with error: use of undeclared identifier 'j'
error: Aborting reading of commands after command #0: 'expr -- tab[j]' failed with error: use of undeclared identifier
'tab'
error: use of undeclared identifier 'j'
Process 81584 stopped
* thread #1, queue = 'com.apple.main-thread', stop reason = step over
    frame #0: 0x0000000100000ec8 trii`main at triinsert.c:43:5
   40
   41       tri_insertion(tableau, 3);
   42
-> 43       printf("apres le tri : ");
   44       for(i = 0; i < 3; i++) printf("%d ", tableau[i]);
   45       printf("\n");
   46
Target 0: (trii) stopped.
(lldb) cont
Process 81584 resuming
apres le tri : 0 0 0
Process 81584 exited with status = 0 (0x00000000)
```

FIGURE 6 – debogage triinsert.c