Impacts Énergétiques

Projet Génie Logiciel

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Sommaire

1. Introduction

Dans ce document, nous analysons l'impact énergétique de notre projet de compilateur Deca et proposons des solutions pour améliorer l'efficacité. La question de l'énergie consommée par les logiciels et les processus de développement est en effet devenue un enjeu important dans le domaine de l'informatique et l'environnement.

Notre analyse couvre deux aspects principaux. D'une part, nous évaluons l'efficience énergétique du code produit par le compilateur. Celui-ci doit générer des instructions adaptées au processeur virtuel ima, en minimisant le nombre de cycles nécessaires pour leur exécution ainsi que les accès mémoire. Ces optimisations permettent de réduire l'énergie consommée par les programmes compilés tout en maintenant leurs performances. Nous avons essayé de proposer des ajustements pour produire un code plus efficace.

D'autre part, nous nous intéressons à l'efficacité énergétique des processus utilisés pour développer et valider le compilateur. Les étapes de compilation, d'exécution des tests et de validation représentent une consommation d'énergie significative, surtout dans ce projet. Nous avons donc étudié nos scripts et nos méthodes de validation afin d'en limiter l'impact énergétique. Cela passe par des optimisations dans l'organisation des tests et la réduction des étapes redondantes.

Nous avons aussi fait quelques tests concernant le temps d'exécution de notre compilateur ainsi que le temps d'exécution des programmes compilés.

Ce document propose ainsi une synthèse des efforts réalisés pour mesurer, analyser et améliorer l'efficacité énergétique de notre projet, en tenant compte des contraintes spécifiques du compilateur Deca.

2. Evaluation de la consommation

Au niveau de la consommation pour les tests, nous n'avons pas constaté de

différences notables sur le temps d'exécution de la compilation ainsi que de consommation au niveau du CPU, seul le jeu de la vie qui est bien plus complet diffère avec un temps de compilation deux fois plus lent. Voir Annexes. Ci-dessous le compte-rendu de performance du jeu de la vie.

```
        Command being timed: "decac
 src/test/deca/codegen/valid/personal/game_of_life/gameoflife.deca"
        User time (seconds): 0.51
        System time (seconds): 0.08
        Percent of CPU this job got: 233%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.26
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 68584
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 12476
        Voluntary context switches: 2835
        Involuntary context switches: 29
        Swaps: 0
        File system inputs: 0
        File system outputs: 152
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
```

3. Impact compilation de Deca vers Ima

La compilation étant quasiment de temps constant, l'exécution des programmes ne l'est pas du tout. Le temps et le nombre de cycles passés varie beaucoup plus en fonction du programme dans l'exécution ima que dans la compilation. Ainsi, nos efforts pour programmer un compilateur efficace n'est pas nécessairement visible dans les mesures que nous avons faites. Voir Annexes.

4. Processus de validation

Durant tout le projet nous avons évidemment testé la validité de nos programmes. Nous sommes conscients que ça utilise beaucoup d'énergie notamment si nous exécutons nos scripts de tests à chaque fois ou bien que nous compilons le projet pour chaque tests (bien que pour la validité du projet il est intéressant de le faire). Pour la partie B, ne nécessitant pas de recompiler à chaque fois, nous avons testé les corrections de bugs et nouvelles fonctionnalités sans recompiler tant que nous n'en avions pas besoin. De plus, pour valider nos changements avec de les mettre sur le git, nous faisons toujours un *test_codegen* pour s'assurer de ne pas avoir fait de modification pouvant compromettre d'autres parties. Nous sommes conscients que ça fait beaucoup de tests, c'est donc pour cela que nous les faisions seulement une fois avant le push. Lorsque nous avions une erreur, nous avons toujours essayé de faire un test unitaire demandant bien moins de consommation qu'en test "complet". C'était un avantage tant en coût énergétique que pratique au niveau du débogage.

5. L'impact de l'extension

Dans notre cas, l'extension nous permet d'avoir un bon impact énergétique, en effet l'extension optimisation est faite pour diminuer le coût des instructions dans le code assembleur. Il faut tout de même faire la part des choses, car le code assembleur sera moins coûteux mais le coût de compilation jusqu'à celui ci l'est plus, il faut donc essayer de compiler son code deca le moins de fois possible.

6. Autre idées concernant l'impact

Nous avons essayé au maximum de ne pas stocker plusieurs fois les mêmes informations dans la mémoire. En effet, dans la partie B par exemple, nous avons essayé le plus possible d'appeler certaines définitions, variables,... sans définir de variable dans

le code java. Au lieu de créer une nouvelle *ClassDefinition classDef = get(definition)* et de l'appeler ensuite, nous avons essayé d'écrire directement dans les instructions suivantes : *si (classDef.Name == "A") retourner classDef* de la manière suivante : si(get(definition)=="A") retourner get(definition). Pour éviter de stocker des informations au maximum. Cependant le code est moins lisible donc il fallait trouver un compromis entre les deux.

7. Annexes

Doc 1 : Résultats de compilation des tests ln2, ln2_fact et syracuse.

```
Test de compilation src/test/deca/codegen/perf/provided/ln2.deca
        Command being timed: "decac src/test/deca/codegen/perf/provided/ln2.deca"
        User time (seconds): 0.30
        System time (seconds): 0.05
        Percent of CPU this job got: 193%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 58240
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9329
        Voluntary context switches: 1732
        Involuntary context switches: 23
        Swaps: 0
        File system inputs: 0
        File system outputs: 80
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0

Test de compilation src/test/deca/codegen/perf/provided/ln2_fct.deca
        Command being timed: "decac src/test/deca/codegen/perf/provided/ln2_fct.deca"
        User time (seconds): 0.32
        System time (seconds): 0.05
        Percent of CPU this job got: 201%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
```

```
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 58988
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9451
        Voluntary context switches: 2063
        Involuntary context switches: 24
        Swaps: 0
        File system inputs: 0
        File system outputs: 80
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0

Test de compilation src/test/deca/codegen/perf/provided/syracuse42.deca
        Command being timed: "decac src/test/deca/codegen/perf/provided/syracuse42.deca"
        User time (seconds): 0.29
        System time (seconds): 0.04
        Percent of CPU this job got: 181%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57840
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9142
        Voluntary context switches: 1666
        Involuntary context switches: 12
        Swaps: 0
        File system inputs: 0
        File system outputs: 72
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
```

Doc 2 : Résultats d'exécution des tests ln2, ln2_fact et syracuse.

```
Test d'exécution src/test/deca/codegen/perf/provided/ln2.ass
6.93148e-01 = 6.93148e-01
Nombre d'instructions :      173  Temps d'execution :  22237
Test d'exécution src/test/deca/codegen/perf/provided/ln2_fct.ass
6.93148e-01 = 6.93148e-01
Nombre d'instructions :      209  Temps d'execution :  24130
Test d'exécution src/test/deca/codegen/perf/provided/syracuse42.ass
8
Nombre d'instructions :      94  Temps d'execution :  2338
```

Doc 3 : Tous les tests codegen avec compilation et exécution.

```
Test de compilation src/test/deca/codegen/valid/personal/all_type_print.deca
        Command                    being               timed:              "decac
src/test/deca/codegen/valid/personal/all_type_print.deca"
        User time (seconds): 0.27
        System time (seconds): 0.04
        Percent of CPU this job got: 184%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57216
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9023
        Voluntary context switches: 1463
        Involuntary context switches: 15
        Swaps: 0
        File system inputs: 0
        File system outputs: 72
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/assign.deca
        Command being timed: "decac src/test/deca/codegen/valid/personal/assign.deca"
        User time (seconds): 0.27
        System time (seconds): 0.04
        Percent of CPU this job got: 180%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
```

Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57456
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9050
Voluntary context switches: 1443
Involuntary context switches: 15
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/binary_operator.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/binary_operator.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 193%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57856
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9082
Voluntary context switches: 1518
Involuntary context switches: 29
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/compte_a_rebours.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/compte_a_rebours.deca"
User time (seconds): 0.29
System time (seconds): 0.04
Percent of CPU this job got: 206%

Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57600
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9085
Voluntary context switches: 1454
Involuntary context switches: 26
Swaps: 0
File system inputs: 0
File system outputs: 104
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/divide_float.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/divide_float.deca"
User time (seconds): 0.26
System time (seconds): 0.06
Percent of CPU this job got: 200%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57592
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9001
Voluntary context switches: 1464
Involuntary context switches: 34
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/divide_int.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/divide_int.deca"
User time (seconds): 0.28

System time (seconds): 0.03
Percent of CPU this job got: 189%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57728
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9057
Voluntary context switches: 1446
Involuntary context switches: 14
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/division_zero.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/division_zero.deca"
User time (seconds): 0.26
System time (seconds): 0.04
Percent of CPU this job got: 190%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57216
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8943
Voluntary context switches: 1344
Involuntary context switches: 20
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/equal.deca

Command being timed: "decac src/test/deca/codegen/valid/personal/equal.deca"
User time (seconds): 0.27
System time (seconds): 0.05
Percent of CPU this job got: 191%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57344
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9029
Voluntary context switches: 1334
Involuntary context switches: 26
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/greater.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/greater.deca"
User time (seconds): 0.29
System time (seconds): 0.04
Percent of CPU this job got: 194%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57464
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8996
Voluntary context switches: 1486
Involuntary context switches: 22
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0

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Test de compilation src/test/deca/codegen/valid/personal/greater_or_equal.deca
        Command   being   timed: "decac
src/test/deca/codegen/valid/personal/greater_or_equal.deca"
        User time (seconds): 0.28
        System time (seconds): 0.04
        Percent of CPU this job got: 204%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57712
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9059
        Voluntary context switches: 1481
        Involuntary context switches: 35
        Swaps: 0
        File system inputs: 0
        File system outputs: 104
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/hello_world.deca
        Command   being   timed: "decac
src/test/deca/codegen/valid/personal/hello_world.deca"
        User time (seconds): 0.26
        System time (seconds): 0.04
        Percent of CPU this job got: 189%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57344
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 8930
        Voluntary context switches: 1330
        Involuntary context switches: 18
        Swaps: 0
        File system inputs: 0
        File system outputs: 72
        Socket messages sent: 0
        Socket messages received: 0

Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/if_else.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/if_else.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 191%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57216
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8945
Voluntary context switches: 1366
Involuntary context switches: 22
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/if_else_decr.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/if_else_decr.deca"
User time (seconds): 0.27
System time (seconds): 0.04
Percent of CPU this job got: 193%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57192
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9057
Voluntary context switches: 1453
Involuntary context switches: 29
Swaps: 0
File system inputs: 0
File system outputs: 72

Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/if_else_hardcore.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/if_else_hardcore.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 195%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57728
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9076
Voluntary context switches: 1821
Involuntary context switches: 19
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/if_then_else.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/if_then_else.deca"
User time (seconds): 0.27
System time (seconds): 0.04
Percent of CPU this job got: 180%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57208
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9018
Voluntary context switches: 1399
Involuntary context switches: 11

Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/include_same_directory.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/include_same_directory.deca"
User time (seconds): 0.26
System time (seconds): 0.05
Percent of CPU this job got: 187%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57088
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8965
Voluntary context switches: 1322
Involuntary context switches: 16
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/logical_op.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/logical_op.deca"
User time (seconds): 0.30
System time (seconds): 0.04
Percent of CPU this job got: 193%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57600
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9143

Voluntary context switches: 1691
Involuntary context switches: 20
Swaps: 0
File system inputs: 0
File system outputs: 80
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/lower.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/lower.deca"
User time (seconds): 0.26
System time (seconds): 0.06
Percent of CPU this job got: 192%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57584
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9051
Voluntary context switches: 1944
Involuntary context switches: 17
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/lower_or_equal.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/lower_or_equal.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 181%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57600
Average resident set size (kbytes): 0

Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9043
Voluntary context switches: 1533
Involuntary context switches: 23
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/modulo.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/modulo.deca"
User time (seconds): 0.27
System time (seconds): 0.04
Percent of CPU this job got: 193%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57336
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8942
Voluntary context switches: 1454
Involuntary context switches: 26
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/multiply.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/multiply.deca"
User time (seconds): 0.27
System time (seconds): 0.03
Percent of CPU this job got: 186%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57204

Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8879
Voluntary context switches: 1340
Involuntary context switches: 11
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/not_equal.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/not_equal.deca"
User time (seconds): 0.27
System time (seconds): 0.04
Percent of CPU this job got: 191%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57472
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8995
Voluntary context switches: 1508
Involuntary context switches: 21
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/not_op.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/not_op.deca"
User time (seconds): 0.27
System time (seconds): 0.04
Percent of CPU this job got: 194%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0

Maximum resident set size (kbytes): 57600
            Average resident set size (kbytes): 0
            Major (requiring I/O) page faults: 0
            Minor (reclaiming a frame) page faults: 9063
            Voluntary context switches: 1720
            Involuntary context switches: 18
            Swaps: 0
            File system inputs: 0
            File system outputs: 72
            Socket messages sent: 0
            Socket messages received: 0
            Signals delivered: 0
            Page size (bytes): 4096
            Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/overflow.deca
            Command being timed: "decac src/test/deca/codegen/valid/personal/overflow.deca"
            User time (seconds): 0.27
            System time (seconds): 0.04
            Percent of CPU this job got: 195%
            Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
            Average shared text size (kbytes): 0
            Average unshared data size (kbytes): 0
            Average stack size (kbytes): 0
            Average total size (kbytes): 0
            Maximum resident set size (kbytes): 57340
            Average resident set size (kbytes): 0
            Major (requiring I/O) page faults: 0
            Minor (reclaiming a frame) page faults: 9023
            Voluntary context switches: 1508
            Involuntary context switches: 20
            Swaps: 0
            File system inputs: 0
            File system outputs: 72
            Socket messages sent: 0
            Socket messages received: 0
            Signals delivered: 0
            Page size (bytes): 4096
            Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/print_hexa.deca
            Command being timed: "decac src/test/deca/codegen/valid/personal/print_hexa.deca"
            User time (seconds): 0.28
            System time (seconds): 0.06
            Percent of CPU this job got: 183%
            Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.18
            Average shared text size (kbytes): 0
            Average unshared data size (kbytes): 0
            Average stack size (kbytes): 0

Average total size (kbytes): 0
Maximum resident set size (kbytes): 57340
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 9017
Voluntary context switches: 1728
Involuntary context switches: 33
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/print_types.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/print_types.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 191%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57460
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8946
Voluntary context switches: 1315
Involuntary context switches: 18
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/print_variable.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/print_variable.deca"
User time (seconds): 0.28
System time (seconds): 0.03
Percent of CPU this job got: 190%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17

Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 57344
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8984
Voluntary context switches: 1423
Involuntary context switches: 30
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/res_operation.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/res_operation.deca"
User time (seconds): 0.28
System time (seconds): 0.04
Percent of CPU this job got: 186%
Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.17
Average shared text size (kbytes): 0
Average unshared data size (kbytes): 0
Average stack size (kbytes): 0
Average total size (kbytes): 0
Maximum resident set size (kbytes): 56960
Average resident set size (kbytes): 0
Major (requiring I/O) page faults: 0
Minor (reclaiming a frame) page faults: 8971
Voluntary context switches: 1360
Involuntary context switches: 14
Swaps: 0
File system inputs: 0
File system outputs: 72
Socket messages sent: 0
Socket messages received: 0
Signals delivered: 0
Page size (bytes): 4096
Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/substract.deca
Command being timed: "decac src/test/deca/codegen/valid/personal/substract.deca"
User time (seconds): 0.26
System time (seconds): 0.05

Percent of CPU this job got: 188%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57344
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 8985
        Voluntary context switches: 1418
        Involuntary context switches: 21
        Swaps: 0
        File system inputs: 0
        File system outputs: 72
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
Test de compilation src/test/deca/codegen/valid/personal/unary_minus.deca
        Command   being   timed: "decac
src/test/deca/codegen/valid/personal/unary_minus.deca"
        User time (seconds): 0.27
        System time (seconds): 0.04
        Percent of CPU this job got: 192%
        Elapsed (wall clock) time (h:mm:ss or m:ss): 0:00.16
        Average shared text size (kbytes): 0
        Average unshared data size (kbytes): 0
        Average stack size (kbytes): 0
        Average total size (kbytes): 0
        Maximum resident set size (kbytes): 57340
        Average resident set size (kbytes): 0
        Major (requiring I/O) page faults: 0
        Minor (reclaiming a frame) page faults: 9016
        Voluntary context switches: 1414
        Involuntary context switches: 22
        Swaps: 0
        File system inputs: 0
        File system outputs: 72
        Socket messages sent: 0
        Socket messages received: 0
        Signals delivered: 0
        Page size (bytes): 4096
        Exit status: 0
Test d'exécution src/test/deca/codegen/valid/personal/all_type_print.ass
4Salut salut4.5

Nombre d'instructions :   37 Temps d'execution : 125
Test d'exécution src/test/deca/codegen/valid/personal/assign.ass
2
5
Nombre d'instructions :   42 Temps d'execution : 121
Test d'exécution src/test/deca/codegen/valid/personal/binary_operator.ass
000
Nombre d'instructions :   67 Temps d'execution : 255
Test d'exécution src/test/deca/codegen/valid/personal/compte_a_rebours.ass
5
4
3
2
1
Nombre d'instructions :   53 Temps d'execution : 627
Test d'exécution src/test/deca/codegen/valid/personal/divide_float.ass
2.00000e+00
Nombre d'instructions :   44 Temps d'execution : 145
Test d'exécution src/test/deca/codegen/valid/personal/divide_int.ass
2
Nombre d'instructions :   44 Temps d'execution : 145
Test d'exécution src/test/deca/codegen/valid/personal/division_zero.ass
Erreur : Division par zero
Nombre d'instructions :   36 Temps d'execution : 120
Test d'exécution src/test/deca/codegen/valid/personal/equal.ass
normal
normal
Nombre d'instructions :   60 Temps d'execution : 191
Test d'exécution src/test/deca/codegen/valid/personal/greater.ass
normal
normal
normal
Nombre d'instructions :   75 Temps d'execution : 277
Test d'exécution src/test/deca/codegen/valid/personal/greater_or_equal.ass
normal
normal
normal
Nombre d'instructions :   75 Temps d'execution : 277
Test d'exécution src/test/deca/codegen/valid/personal/hello_world.ass
Hello world ! (avec print)Hello world ! (avec println)
Nombre d'instructions :   33 Temps d'execution : 173
Test d'exécution src/test/deca/codegen/valid/personal/if_else.ass
0
1
1
Nombre d'instructions :   54 Temps d'execution : 172
Test d'exécution src/test/deca/codegen/valid/personal/if_else_decr.ass

0
Nombre d'instructions :   45 Temps d'execution : 112
Test d'exécution src/test/deca/codegen/valid/personal/if_else_hardcore.ass
123456Nombre d'instructions :   61 Temps d'execution : 205
Test d'exécution src/test/deca/codegen/valid/personal/if_then_else.ass
2Nombre d'instructions :   46 Temps d'execution : 73
Test d'exécution src/test/deca/codegen/valid/personal/include_same_directory.ass
2
5
Nombre d'instructions :   42 Temps d'execution : 121
Test d'exécution src/test/deca/codegen/valid/personal/logical_op.ass
TEST AND
Devrait print : true
true
TEST OR
Devrait print : true true true
true
true
true
Nombre d'instructions :   158 Temps d'execution : 817
Test d'exécution src/test/deca/codegen/valid/personal/lower.ass
normal
normal
normal
Nombre d'instructions :   75 Temps d'execution : 277
Test d'exécution src/test/deca/codegen/valid/personal/lower_or_equal.ass
normal
normal
normal
normal
Nombre d'instructions :   90 Temps d'execution : 363
Test d'exécution src/test/deca/codegen/valid/personal/modulo.ass
1
Nombre d'instructions :   39 Temps d'execution : 115
Test d'exécution src/test/deca/codegen/valid/personal/multiply.ass
4
Nombre d'instructions :   37 Temps d'execution : 85
Test d'exécution src/test/deca/codegen/valid/personal/not_equal.ass
normal
normal
Nombre d'instructions :   60 Temps d'execution : 191
Test d'exécution src/test/deca/codegen/valid/personal/not_op.ass
ok
non
Nombre d'instructions :   56 Temps d'execution : 161
Test d'exécution src/test/deca/codegen/valid/personal/overflow.ass
Erreur : Débordement arithmétique

Nombre d'instructions :   38 Temps d'execution : 148
Test d'exécution src/test/deca/codegen/valid/personal/print_hexa.ass
String : Bonjour
Entier : 12
Float : 40133333
Plusieurs : 1 test 40533333
Nombre d'instructions :   44 Temps d'execution : 375
Test d'exécution src/test/deca/codegen/valid/personal/print_types.ass
String : Bonjour
Entier : 12
Float : 2.3
Plusieurs : 1 test 3.3
Nombre d'instructions :   44 Temps d'execution : 355
Test d'exécution src/test/deca/codegen/valid/personal/print_variable.ass
2
2.30000e+00
Nombre d'instructions :   40 Temps d'execution : 111
Test d'exécution src/test/deca/codegen/valid/personal/res_operation.ass
4
Nombre d'instructions :   43 Temps d'execution : 91
Test d'exécution src/test/deca/codegen/valid/personal/substract.ass
9
Nombre d'instructions :   38 Temps d'execution : 77
Test d'exécution src/test/deca/codegen/valid/personal/unary_minus.ass
3
Nombre d'instructions :   41 Temps d'execution : 83