## SPEC® CPU2017 Integer Speed Result

**Cisco Systems**
Cisco UCS C220 M5 (Intel Xeon Gold 6138 2.00 GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>9.10</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>9.34</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9019
**Test Date:** Dec-2018
**Test Sponsor:** Cisco Systems
**Hardware Availability:** Aug-2017
**Tested by:** Cisco Systems
**Software Availability:** Nov-2018

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base (9.10)</th>
<th>SPECspeed2017_int_peak (9.34)</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s 40</td>
<td>6.31</td>
<td>7.55</td>
</tr>
<tr>
<td>gcc_s 40</td>
<td>9.64</td>
<td>9.41</td>
</tr>
<tr>
<td>mcf_s 40</td>
<td>11.0</td>
<td>9.51</td>
</tr>
<tr>
<td>omnetpp_s 40</td>
<td>6.99</td>
<td>6.91</td>
</tr>
<tr>
<td>xalancbmk_s 40</td>
<td>13.1</td>
<td>13.2</td>
</tr>
<tr>
<td>x264_s 40</td>
<td>5.18</td>
<td>5.12</td>
</tr>
<tr>
<td>deepsjeng_s 40</td>
<td>4.53</td>
<td>4.51</td>
</tr>
<tr>
<td>leela_s 40</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>exchange2_s 40</td>
<td>13.4</td>
<td>22.0</td>
</tr>
<tr>
<td>xz_s 40</td>
<td>22.2</td>
<td>22.0</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Software</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 12 SP3 (x86_64) 4.4.120-94.17-default</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.1.144 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 4.0.1 released Oct-2018</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator v5.0.1</td>
</tr>
</tbody>
</table>

### CPU Information

- **CPU Name:** Intel Xeon Gold 6138
- **Max MHz.:** 3700
- **Nominal:** 2000 MHz
- **Enabled:** 40 cores, 2 chips
- **Orderable:** 1,2 Chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)
- **Storage:** 1 x 240 GB M.2 SATA SSD
- **Other:** None

### Memory Information

- **8 GB (2 x 4 GB 2Rx4 PC4-2666V-R)"
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**SPECspeed2017_int_base = 9.10**

**SPECspeed2017_int_peak = 9.34**

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>282</td>
<td>6.29</td>
<td>281</td>
<td>6.31</td>
<td>281</td>
<td>6.31</td>
<td>40</td>
<td>235</td>
<td>7.55</td>
<td>235</td>
<td>7.76</td>
<td>7.52</td>
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<tr>
<td>602.gcc_s</td>
<td>40</td>
<td>426</td>
<td>9.35</td>
<td>422</td>
<td>9.43</td>
<td>423</td>
<td>9.41</td>
<td>40</td>
<td>416</td>
<td>9.58</td>
<td>413</td>
<td>9.64</td>
<td>9.65</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>40</td>
<td>428</td>
<td>11.0</td>
<td>425</td>
<td>11.1</td>
<td>423</td>
<td>11.0</td>
<td>40</td>
<td>424</td>
<td>11.1</td>
<td>425</td>
<td>11.1</td>
<td>11.1</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>40</td>
<td>236</td>
<td>6.91</td>
<td>241</td>
<td>6.76</td>
<td>231</td>
<td>7.06</td>
<td>40</td>
<td>240</td>
<td>6.79</td>
<td>248</td>
<td>6.58</td>
<td>6.58</td>
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<tr>
<td>623.xalanchmk_s</td>
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<td>150</td>
<td>9.48</td>
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<td>9.51</td>
<td>149</td>
<td>9.53</td>
<td>40</td>
<td>139</td>
<td>10.2</td>
<td>138</td>
<td>10.3</td>
<td>10.2</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>40</td>
<td>135</td>
<td>13.1</td>
<td>135</td>
<td>13.0</td>
<td>134</td>
<td>13.1</td>
<td>40</td>
<td>135</td>
<td>13.1</td>
<td>135</td>
<td>13.1</td>
<td>13.1</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
<td>277</td>
<td>5.17</td>
<td>276</td>
<td>5.19</td>
<td>277</td>
<td>5.18</td>
<td>40</td>
<td>280</td>
<td>5.11</td>
<td>280</td>
<td>5.13</td>
<td>5.12</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>40</td>
<td>377</td>
<td>4.53</td>
<td>378</td>
<td>4.51</td>
<td>377</td>
<td>4.53</td>
<td>40</td>
<td>378</td>
<td>4.51</td>
<td>378</td>
<td>4.52</td>
<td>4.51</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>40</td>
<td>219</td>
<td>13.4</td>
<td>220</td>
<td>13.4</td>
<td>219</td>
<td>13.4</td>
<td>40</td>
<td>219</td>
<td>13.4</td>
<td>219</td>
<td>13.4</td>
<td>13.4</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
<td>284</td>
<td>21.8</td>
<td>281</td>
<td>22.0</td>
<td>281</td>
<td>22.0</td>
<td>40</td>
<td>279</td>
<td>22.2</td>
<td>279</td>
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**SPECspeed2017_int_base = 9.10**

**SPECspeed2017_int_peak = 9.34**

---

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

---

### General Notes

Environment variables set by runcpu before the start of the run:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:

```bash
sync; echo 3>/proc/sys/vm/drop_caches
```

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

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## Cisco Systems

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<tr>
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<tr>
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<td>Cisco Systems</td>
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<td>Tested by</td>
<td>Cisco Systems</td>
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<tr>
<td>Test Date</td>
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<td>Aug-2017</td>
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</tr>
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</table>

## Platform Notes

**BIOS Settings:**
- Intel HyperThreading Technology set to Disabled
- CPU performance set to Enterprise
- Power Performance Tuning set to OS Controls
- SNC set to Disabled
- IMC Interleaving set to Auto
- Patrol Scrub set to Disabled

**Sysinfo program** /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-vaxe Wed Jan 2 00:25:50 2019

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo

- model name: Intel(R) Xeon(R) Gold 6138 CPU @ 2.00GHz
- 2 "physical id"s (chips)
- 40 "processors"

**cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)**

- cpu cores : 20
- siblings : 20
- physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
- physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:

- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 1
- Core(s) per socket: 20
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6138 CPU @ 2.00GHz
- Stepping: 4
- CPU MHz: 3385.923
- CPU max MHz: 3700.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 3990.58
- Virtualization: VT-x
- L1d cache: 32K

*(Continued on next page)*
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**Platform Notes (Continued)**

```plaintext
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl x87nop mmxext npg cx8 mpx mpx444 popcnt clflushopt dts mce lm tsc_strap clflush dtes64 hwp_tcap pdcm tsc_deadline_timer cpuid sse4_1 sse4_2 x2apic msr aarch64 fsal fnmat stibp kaiser tsync tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnowprefetch ida arat epb invpcid_single pln pts dtherm hwlp act_window hwp_epp hwp_krc intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vmni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke
```

/proc/cpuinfo cache data

```
cache size: 28160 KB
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```plaintext
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
node 0 size: 385631 MB
node 0 free: 385002 MB
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
node 1 size: 387060 MB
node 1 free: 386718 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10
```

From /proc/meminfo

```
MemTotal:       791236528 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From /etc/*release* /etc/*version*

```
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.
  os-release:
```

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CPU2017 License: 9019
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Platform Notes (Continued)

NAME="SLES"
VERSION="12-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
Linux linux-vaxe 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

run-level 3 Jan 2 00:21

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb1 xfs 224G 29G 196G 13% /

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Cisco Systems, Inc. C220M5.4.0.1.139.1003182107 10/03/2018
Memory:
11x 0xCE00 M393A4K40BB2-CTD 32 GB 2 rank 2666
13x 0xCE00 M393A4K40CB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)
==============================================================================

icc (ICC) 19.0.1.144 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================

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Compiler Version Notes (Continued)

CC 600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
-------------------------------
icc (ICC) 19.0.1.144 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
641.leela_s(base)
-----------------------------
icpc (ICC) 19.0.1.144 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CXXC 620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)
641.leela_s(peak)
-----------------------------
icpc (ICC) 19.0.1.144 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

FC 648.exchange2_s(base, peak)
-----------------------------
ifort (IFORT) 19.0.1.144 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)
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Base Portability Flags (Continued)

602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64 -DSPEC_LINUX
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
- Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
- L/home/cpu2017/je5.0.1-64/ -ljemalloc

C++ benchmarks:
- Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=3 -L/home/cpu2017/je5.0.1-64/ -ljemalloc

Fortran benchmarks:
- Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
- L/home/cpu2017/je5.0.1-64/ -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks (except as noted below):
icpc -m64

623.xalancbmk_s: icpc -m32 -L/opt/intel/lib/ia32

Fortran benchmarks:
ifort -m64
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Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/home/cpu2017/je5.0.1-64/ -ljemalloc

602.gcc_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/home/cpu2017/je5.0.1-64/ -ljemalloc

605.mcf_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/home/cpu2017/je5.0.1-64/ -ljemalloc

625.x264_s: -Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/home/cpu2017/je5.0.1-64/ -ljemalloc

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: -Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/home/cpu2017/je5.0.1-64/ -ljemalloc

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Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Gold 6138 2.00 GHz)

SPECspeed2017_int_base = 9.10
SPECspeed2017_int_peak = 9.34

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Peak Optimization Flags (Continued)

623.xalancbmk_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/home/cpu2017/je5.0.1-32/ -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/home/cpu2017/je5.0.1-64/ -ljemalloc

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0-official-linux64.xml
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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