

CONTENTS

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1. OVERVIEW
  2. NEW FEATURES
  3. SYSTEM REQUIREMENTS
  4. WHERE TO FIND THE RELEASE
  5. INSTALLATION NOTES
  6. DOCUMENTATION
  7. KNOWN LIMITATIONS AND TROUBLESHOOTING
  8. TECHNICAL SUPPORT
  9. DISCLAIMER AND LEGAL INFORMATION
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1. OVERVIEW

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Intel® Cluster Checker verifies the configuration and performance of Linux\*-based clusters and checks the cluster's compliance with the Intel® Select Solutions for Simulation and Modeling.

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1.1. RELATED PRODUCTS AND SERVICES

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Information about Intel® software development products is available at <http://www.intel.com/software/products>.

These are some of the products related to Intel® Cluster Checker:

- o The Intel® C++ and Fortran Compilers include advanced optimization and multithreading capabilities, highly optimized performance libraries, and analysis tools for creating fast reliable multithreaded applications.

<http://www.intel.com/software/products/compilers>

- o The Intel® MPI Library for Linux\*, the Intel® Trace Analyzer and Collector for Linux\*, and the Intel® Math Kernel Library Cluster Edition for Linux\* are the most awarded development tools. They create, analyze, and optimize high-performance applications on clusters of Intel® processor-based systems.

<http://www.intel.com/software/products>

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2. NEW FEATURES

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2.1 WHAT'S NEW IN VERSION 2019 Update 6

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- Added environment modules support for Intel® Cluster Checker.
  - The Environment Module file is found  
`<INSTALL_PATH>/clck/2019.6/env/modulefile/`

- The command: `module use <INSTALL_PATH>/clck/2019.6/env/modulefile/` will add the clck to your module environment
- `module av` will show what modules are available to be loaded via module load
- Added patch to address SQLite CVE-2019-9937.
- Improved clarity and response output for certain checks.
- Improved handling and analysis of data from multiple databases. Analysis is performed on the most recent data collected when there exists multiple collections of the same data types.

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## 2.2 OLDER VERSIONS

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### 2.2.1 Version 2019 Update 5.0

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- New default tests with faster execution.
- New predefined in-depth test sets made for user or admin specific analysis.
- Enhanced summary output lists brief facts on nodes and issues.
- Troubleshooting tests on prerequisites for Intel® MPI Library.
- Verifies the uniformity of the BIOS and management firmware settings for the Intel® Server Boards through Intel's System Configuration Utility (syscfg).
- Support for the latest Intel processors (Intel® Xeon® Platinum 9200 Processor Family).
- Support for validation of Intel® Select Solutions for Simulation & Visualisation.
- New `-t` option to set data age threshold.
- Bug fixes and improvements, CVE updates.

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### 2.2.2 Version 2019 Update 4.0

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- Enhanced functionality for testing memory uniformity.
- Added flexibility on checks for memlock limits to InfiniBand and Intel® Omni-Path Architecture (Intel® OPA) checks.
- Improved support for diskless clusters.
- Improved messages and bug fixes.

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### 2.2.3 Version 2019 Update 3.5

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- Added support for checking of second-generation Intel® Xeon® Scalable Processors by privileged or non-privileged users.
- Updated support for validation of Intel® Select Solutions for Simulation and Modeling to include the second-generation Intel® Xeon® Scalable Processor solution.
- Added support for checking Intel® Optane(TM) DC Persistent Memory configurations and uniformity.
- Included support for second-generation Intel® Xeon® Scalable Processor with the Intel HPC Platform Specification.
- Added checking for the Intel® Parallel Studio XE 2019.0 runtimes.

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### 2.2.4 Version 2019 Update 2.1

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- Updated support for validation of Intel® Select Solutions for Simulation and Modeling.

- Added in support for Intel HPC Platform Specification 2018.0.
- Intel® Cluster Checker 2019 Update 2.1 includes functional and security updates. Users should update to the latest version.

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#### 2.2.5 Version 2019 Update 2

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- Intel® Cluster Checker 2019 Update 2 includes functional and security updates. Users should update to the latest version.

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#### 2.2.6 Version 2019 Gold

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- New 'clck' command simplifies execution with a single command.
- Added improved output messaging:
  - New compact summary output provided on screen.
  - Details of analysis provided in the output logfile.
  - Simplified scheme to assess issues as 'CRITICAL', 'WARNING', or 'INFORMATIONAL'
  - Added -R option for specifying where results are written.
  - Changed -o option to specify where log output is written.
- Added performance threshold checking for Intel® Xeon Phi(TM) Processor x205 Product Family.
- Added -X command line option, allowing a user to obtain a list of available framework definitions and their respective descriptions on data collected and analysis tests.
- Added the ability to mark two snapshots of a cluster state to identify changes. Currently supported with the following framework definitions: rpm\_snapshot, hardware\_snapshot, files\_snapshot.
- Added a user option to collect any missing or old data before analysis.
- Added ability to collect data on a cluster that does not have pdsh if the Intel® MPI Library is installed.
- Added the ability to collect data without specifying a node file if nodes are allocated through SLURM.
- Added in support for validation of Intel® Select Solutions for Simulation and Modeling.
- New Intel® Cluster Checker API.

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#### 2.2.7 Version 2018 Update 3

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- Resolved an issue with running lshw without privileged access.

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#### 2.2.8 Version 2018 Update 2

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- Added support for Intel® Select Solutions Framework Definitions.

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#### 2.2.9 Version 2018 Update 1

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- Enabled provider configuration as part of Framework Definitions.
- Enabled latest Intel® Xeon® processors.
- Renamed predefined Framework Definition names to be more informative.
- Added support for the SGEMM benchmark.
- Improved memory checking.
- Enhanced user visible message output.

- Added checks for Intel® Omni-Path Fabric subnets.
- Bug fixes.

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#### 2.2.10 Version 2018

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- Added support for Intel® Xeon® Scalable processors.
- Added Framework Definition feature to allow for customization of analysis.
- Added support for Intel® Turbo Boost Technology validation.
- Added support for analysis from multiple database sources.
- Updated samples and SDK.
- Converted documentation to online format.
- Enhanced Intel® Omni-Path Architecture validation.
- Added OpenFabrics Interfaces support.
- Enhanced user viewable message output.
- Bug fixes

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#### 2.2.11 Version 2017 Update 2

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- Improved support for Intel® Xeon Phi(TM) Product Family x200 processors.
- Improved support for Intel® Omni-Path Architecture.
- Bug fixes.

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#### 2.2.12 Version 2017 Update 1

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- Added Intel® Scalable System Framework Support.
- Deprecated support for Intel® Cluster Ready.
- Added additional support for Intel® Xeon Phi(TM) Product Family x200 processors.
- Removed heartbeat functionality.
- Bug fixes.

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#### 2.2.13 Version 2017

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- Added support for Intel® Xeon Phi(TM) Product Family x200 processors.
- Added support for the Lustre\* file system.
- Significantly improved analysis performance for large databases.
- Extended the API to provide the ability to collect data.
- The separate analyzer (clck.xml) and data collection (clckd.xml) configuration files were merged into a single file (clck.xml). Previous configuration files are not compatible.
- Allows more granular suppressions. See the section on suppressions in the User's Guide for more information.
- The asynchronous data collection daemons, clckd and clck-serverd, have been replaced by a plugin to the Open Resilient Cluster Manager\* (ORCM). See orcm/README for more information. The ORCM plugin is a technical preview feature; please see the Known Limitation section for its current limitations.
- Databases from previous versions of the product are incompatible with version 2017 due to database schema changes.
- The samples have been moved online and are no longer distributed as part of the product. They are now available at the URL below:  
<https://software.intel.com/en-us/product-code-samples?topic=20903>

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### 3. SYSTEM REQUIREMENTS

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The following sections describe hardware and software requirements.

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#### 3.1. HARDWARE

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- Intel® Xeon® processor (Intel® 64 architecture)
- 1 GB of RAM recommended
- 160 MB of free hard disk space required for installation

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#### 3.2. SOFTWARE

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Operating Systems:

- CentOS 6 and 7
- Red Hat\* Enterprise Linux\* 6 and 7
- SUSE\* Linux\* Enterprise Server 11 and 12
- Ubuntu\* 14.04, 16.04, and 17.04 (See Section 7 for known issues)

Runtimes:

- Intel® MPI Library

Note: While the full SDK versions of these components fulfill the requirement, only the runtime library is required.

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### 4. WHERE TO FIND THE RELEASE

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Intel® Cluster Checker can be installed with Intel® Parallel Studio XE, standalone via Intel® Registration Center: <https://registrationcenter.intel.com> or as a standalone package via the Intel® YUM repository.

See the Installation section of the User Guide for more information.

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### 5. INSTALLATION NOTES

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Intel® Cluster Checker is distributed as a standalone package.

To install package, run the following commands:

```
% tar -xzf l_clck_p_2019.6.<package#>.tgz -C /tmp
% cd /tmp/l_clck_p_2019.6.<package#>
% ./install.sh
```

Notes:

- The default Intel® Cluster Checker install path is `/opt/intel/clck/2019.6`
- Intel® Cluster Checker needs to be installed on all nodes. This can either be accomplished either by installing into a

- shared directory or by installing a local copy on each node.
- To install a local copy on each node, repeat the package installation for each node.

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## 6. DOCUMENTATION

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This release of Intel® Cluster Checker includes the following documentation:

The Getting Started Guide walks through using Intel® Cluster Checker for the first time.

The Intel® Cluster Checker User's Guide contains information about how to use, configure, and extend Intel® Cluster Checker. The User's Guide describes the basic usage models, contains information about specific configuration options, explains how to embed Intel® Cluster Checker functionality into other applications, shows how to add new checks to the tool, and demonstrates how to modify existing checks.

The Intel® Cluster Checker API reference describes the API that may be used to embed Intel® Cluster Checker functionality into other software programs.

The documentation can be found at:

<https://software.intel.com/en-us/intel-cluster-checker-support/documentation>.

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## 7. KNOWN LIMITATIONS AND TROUBLESHOOTING

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The following is a list of known issues in this release.

- Data collection behavior and functionality
  - o Please note that for execution of HPCG benchmarks (such as in the checks `hpcg_single` and `hpcg_cluster`) on non-standard install path for the Intel® MPI Library and Intel® Math Kernel Library (Intel® MKL) runtime, libraries must be installed and be exported in the `LD_LIBRARY_PATH` on the system.
  - o Executing `imb_pingpong_fabric_performance` may fail when the Intel® Parallel Studio 2019 Update 4 or 5 environment is initialized using the `psxevars` script. Please source the corresponding `mpivars` script after sourcing `psxevars` to ensure access to the Intel® MPI Library IMB benchmark executables.
  - o Executing Intel® Cluster Checker framework definitions which run cluster-wide checks, when configured to use the Intel® MPI library collect extension, may fail with Intel® MPI Library 2019 Update 3. Please use Intel® MPI Library 2019 Update 4 or later (or Update 2 or 1) instead.
  - o If the temporary directory used during collection is located on a shared file system, the directory will not be deleted.

- o The ORCM plugin is a technical preview feature.
- o Databases located on NFS file systems mounted with the "nolock" option are not supported. Not all data from concurrent data collection instances per database will be written to the database and the database may become corrupted. A single data collector instance per database can usually be used successfully in this case.
- o The error "Error: disk I/O error" may be generated when accessing a database located on a Lustre file system. The Lustre file system must be mounted with the "-o flock" option.
- o The 'iozone' data provider does not execute correctly on diskless clusters.
- o If collecting data as root, the value of the CLCK\_SHARED\_TEMP\_DIR environment variable must be set to the fully-qualified path of a directory accessible on all nodes.
- o When collecting data on Ubuntu\*, if the installed "which" command does not support --skip-functions and --skip-alias, a few providers will need additional configuration and a few providers will not run successfully. The following providers must be configured for the specification of absolute binary location:
  - cpuid
  - cpupower
  - dmesg
  - ibstat
  - lscpu
  - numactl
  - opahfirev
  - opasmaquery

Refer to Intel® Cluster Checker User Manual, Chapter 6 for details about specifying absolute binary paths for the above mentioned providers.

- o Intel® Cluster Checker uses the command "ldconfig -p" as well as the environment variable LD\_LIBRARY\_PATH to detect the presence of required libraries. In order for Intel® Cluster Checker to detect required libraries, they must be present in the LD\_LIBRARY\_PATH or the result of "ldconfig -p". (Applies to the Framework Definitions second-gen-xeon-sp\_user, second-gen-xeon-sp\_priv, intel\_hpc\_platform\_compat-hpc-2018.0, intel\_hpc\_platform\_sdvis-core-2018.0, and intel\_hpc\_platform\_second-gen-xeon-sp-2019.0)
- o In order for Intel® Cluster Checker to detect the Intel® Distribution for Python\*, it must be in the user's PATH. (Applies to the Framework Definitions second-gen-xeon-sp\_user, second-gen-xeon-sp\_priv, intel\_hpc\_platform\_compat-hpc-2018.0, and intel\_hpc\_platform\_second-gen-xeon-sp-2019.0)
- o If Intel® Parallel Studio is sourced before the Intel® Distribution for Python\* in the user's environment, Intel® Cluster Checker is unable to detect all the required libraries for Intel® MPI Library. (Applies to the Framework Definitions second-gen-xeon-sp\_user, second-gen-xeon-sp\_priv, intel\_hpc\_platform\_compat-hpc-2018.0, and

intel\_hpc\_platform\_second-gen-xeon-sp-2019.0)

- o The detected version of Intel® MPI Library is used to determine whether Intel® Cluster Checker checks for Intel® Parallel Studio 2018 or 2019. If the Intel® MPI Library version does not match the version of the rest of Intel® Parallel Studio, the wrong set of libraries will be checked. (Applies to the Framework Definition intel\_hpc\_platform\_compat-hpc-2018.0)
- o Intel® Cluster Checker can only detect the version of the Intel® Fortran Compiler version with Intel® Parallel Studio 2017 or later. (Applies to the Framework Definitions second-gen-xeon-sp\_user, second-gen-xeon-sp\_priv, intel\_hpc\_platform\_compat-hpc-2018.0, and intel\_hpc\_platform\_second-gen-xeon-sp-2019.0)
- o In addition, there are limitations to validating Intel® Select Solutions compliance when running on Ubuntu. It is not recommended to use Intel® Cluster Checker for Intel® Select Solutions compliance when running on Ubuntu.

#### - Analysis behavior and functionality

- o Clusters containing dual port InfiniBand\* adapters where the second port is unused should suppress the 'infiniband-port-physical-state-not-linkup' and 'infiniband-port-state-not-active' signs. See Chapter 4 of the User's Guide for more information on how to suppress signs.
- o When using the Linux\* boot parameter isolcpus with an Intel® Xeon Phi(TM) processor using default MPI settings, MPI based applications may fail. If possible, change or remove the isolcpus Linux\* boot parameter. If this is not possible and you are using the Intel® MPI Library, you can try setting I\_MPI\_PIN to off. Refer to the Intel® Cluster Checker reference manual for details on specifying environment variables for tests.
- o When run with dgemm/dgemm\_cpu\_performance or stream/stream\_memory\_bandwidth\_performance framework, "stream-outlier" or "dgemm-data-is-substandard" may be observed as the corresponding provider scripts may not yield the expected performance with SNC-2/SNC-4 cluster mode and Flat memory mode configurations for Intel® Xeon Phi(TM) processor. There may be an issue with the kernel itself (BZ#1479763), documented at <https://access.redhat.com/errata/RHBA-2017:2581>. If there are no corresponding diagnoses, the signs may be suppressed.
- o The sign paraview-missing fires despite ParaView\* being present on the system. (Applies to the Framework Definition intel\_hpc\_platform\_sdviz-cluster-2018.0)



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## 8. TECHNICAL SUPPORT

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If you did not register Intel® Cluster Checker during installation, please do so at the Intel® Software Development Products Registration Center at <http://registrationcenter.intel.com>. Registration entitles you to free technical support, product updates and upgrades for the duration of the support term.

For information about how to find Technical Support, Product Updates, User Forums, FAQs, tips and tricks, and other support information, please visit: <http://www.intel.com/software/products/support/>

Note: If your distributor provides technical support for this product, please contact them for support rather than Intel.

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