



HEXAGON

White Paper

ERDAS Engine

A Simple and Cost-Effective Way to Increase Processing Capacity

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Solving the Throughput Challenge

As geospatial analysts process the extremely large imagery datasets that are typical in this industry, they are faced with a choice: save money by slowly generating data products using the resources they already have, or generate them more quickly by purchasing additional software licenses.

ERDAS Engine lets your organization boost your processing power for less money. ERDAS Engine compliments ERDAS IMAGINE and IMAGINE Photogrammetry by enabling them to distribute demanding, resource-intensive processes among multiple workstations or multiple cores on a single workstation so that multiple processes can run simultaneously, allowing faster completion of the work.

This offering is ideal for any organization that needs to cost-effectively increase throughput, either on a daily basis or due to temporary surges in demand.

ERDAS Engine

ERDAS Engine is designed to complement ERDAS IMAGINE and IMAGINE Photogrammetry by enabling them to run more processes simultaneously.

To use ERDAS Engine, organizations must still obtain a license of ERDAS IMAGINE and/or IMAGINE Photogrammetry for each user, plus licenses for any additional modules needed to complete the particular workflow processes. For example, a license for IMAGINE SAR Interferometry would be required to batch process multiple SAR images overnight using the Coherence Change Detection (CCD) algorithms.

The individual product licenses themselves enable a certain number of simultaneous (parallel) processes (currently four) to be run locally, or a user can submit jobs to an application such as HTCondor for distributed handling. Each ERDAS Engine license enables four more simultaneous processes to be initiated.

To best understand the benefit of the ERDAS Engine, consider a situation where a natural disaster has just occurred in a tropical (cloud covered) region and the disaster response agencies are urgently in need of change analysis maps for use in the field. Such products can be accurately produced by the Coherence Change Detection (CCD) capabilities of the IMAGINE SAR Interferometry module, but the process is resource-intensive and time-consuming.

The response agency has not only purchased a license of IMAGINE Advantage and IMAGINE SAR Interferometry, but also four licenses of ERDAS Engine to provide reserve capacity for this type of situation. Now, they can set up a batch queue of 100 CCD SAR pairs to be processed. Because ERDAS IMAGINE Advantage can execute four simultaneous processes and each of the four ERDAS Engines can execute four processes, the response agency can now simultaneously process up to 20 CCD jobs at a time to efficiently work through all 100 pairs in a timely fashion.

Licensing Checks

With ERDAS Engine, you can scale your processing for temporarily varying needs, or to increase throughput in your day-to-day work. ERDAS Engine can be used alongside all ERDAS IMAGINE desktop products.

Each ERDAS Engine product provides for four more simultaneous processes to be run via Distributed or Local batch processing. This is achieved by each license file for ERDAS Engine containing four unlocks for the "eeprocess" feature code, one of which is consumed each time a process is started and that is released when the process finishes.

Processes to be Parallelized

As previously mentioned, almost any process that can be run in ERDAS IMAGINE or IMAGINE Photogrammetry and that has a Batch button or other mechanism for setting up a queue of multiple jobs to be



processed can benefit from parallelization of those processes. ERDAS Engine enables more processes to be run simultaneously, either locally using multiple CPU/cores or in a distributed fashion across a network.

Some of the common operations that can benefit from the parallelization ERDAS Engine provides are:

- **Import**, such as converting multiple images from the USGS Landsat archive format
- **Export**, such as converting multiple images from IMG format to wavelet compressed ECW or JPEG 2000
- Create **Pyramids** (RRDs), **Statistics**, and change projection information on multiple images using the Image Metadata editor tool
- Generate **RSETs** for NITF imagery
- **Reproject** images from one projected coordinate system to another
- **Resample** imagery, such as automatically orthoresampling NITF imagery using RPCs and terrain data
- **Image Interpreter** functions such as Subset, Pan Sharpen, Change Pixel Size, Layer Stack, LUT Stretch, Rescale, NDVI and so on
- Apply **Unsupervised Classification** to multiple images
- **Segmentation**
- Apply an object-based **feature extraction** model to multiple input tiles of GeoTIFF imagery using IMAGINE Objective
- **Ortho-generation** from IMAGINE Photogrammetry
- Automatically extract **terrain point clouds** from blocks of imagery using Auto DTM
- Many more functions available in ERDAS IMAGINE and IMAGINE Photogrammetry

How many ERDAS Engines should I purchase?

This is a complex question that depends on several factors, including:

- How much data will you be processing?
- What processes are you trying to run?
- How long are you willing or able to wait for the processes to complete?
- What hardware resources (number of computers and number of cores) can you dedicate to the effort?
- Do you want to set up a distributed computing environment such as HTCondor?

Examining the following common use cases and their circumstances may be helpful as you consider your own situation.

Local Processing

The simplest scenario involves a **local computer** with multiple CPUs/cores.

For example, IMAGINE Advantage might be installed on a computer with two quad-core CPUs capable of running up to eight heavy-duty processes simultaneously. You attempt to run decorrelation stretch on 100 input images by feeding all 100 images to the Batch Tool for local processing to start after you leave work for the day. With IMAGINE Advantage, you can run up to four images through Decorrelation Stretch at a time. Doing this, it is possible that four of the cores in the computer are not being used during the processing. However, adding an ERDAS Engine means you can run up to eight images through Decorrelation Stretch, fully utilizing the resources of the computer and completing the overall job more rapidly. This might mean the difference between coming to work the next day to find your batch job is complete or not.

The number of ERDAS Engine licenses to purchase and whether to buy any at all depends on the time-sensitivity of the work.

Distributed Processing

A more complex scenario involves using software such as HTCondor to set up a **distributed processing network** with multiple computers, which themselves might have multiple CPUs/cores.

For example, a distributed processing network might include ten computers, each with a quad-core CPU and an installation of IMAGINE Photogrammetry. During the day, these are used for regular ERDAS IMAGINE



processing. In the evenings, these computers are designated as processing nodes in a HTCondor cluster. The 100-image decorrelation stretching job described above could then be sent to HTCondor from one of these computers. HTCondor can then schedule the jobs to run simultaneously on all ten machines, with one process per core and four processes per node computer, for a total of 40 simultaneous jobs.

Since there are 40 ERDAS Engine process licenses available from the floating license server (because each of the 10 IMAGINE Photogrammetry licenses is able to run four simultaneous jobs) all 40 jobs can run simultaneously. Therefore, there is no advantage to purchasing additional ERDAS Engine licenses.

Cloud Computing

Another scenario includes the ten desktop computers, as well as network access to a dedicated cloud of another 40 CPUs/cores for distributed processing. In this instance, there are a total of 80 CPUs/cores potentially available for simultaneous processing overnight. Fully utilizing all 80 CPUs/cores simultaneously for processing, such as running Auto DTM to extract surface models from stereo pairs of imagery, would consume not only the 10 IMAGINE Photogrammetry licenses, but also at least one Auto DTM (for the computer submitting the Auto DTM jobs) and nine ERDAS Engine licenses. With this level of licensing, 80 stereo pairs can be simultaneously processed to extract 80 surface models over the cloud network.

Simple Answer

To determine how many ERDAS Engine processes your organization could use, first determine the number of CPUs/cores available for processing. Each license of IMAGINE Advantage, IMAGINE Professional, and IMAGINE Photogrammetry you have purchased provides four ERDAS Engine processes. Each license of IMAGINE Essentials provides one ERDAS Engine process. If the number of CPUs/cores available exceeds the number of ERDAS Engine processes provided with your licensed products, then you can potentially benefit from the purchase of additional ERDAS Engines. Each additional ERDAS Engine you purchase provides the ability to utilize four more CPUs/cores to run simultaneous processes.

Frequently Asked Questions

Q: What is HTCondor?

A: HTCondor is a specialized workload management system for resource-intensive jobs. Like other full-featured batch systems, HTCondor provides a job queuing mechanism, scheduling policy, priority scheme, resource monitoring, and resource management. Users submit their serial or parallel jobs to HTCondor, HTCondor places them into a queue, chooses when and where to run the jobs based upon a policy, carefully monitors their progress, and ultimately informs the user upon completion.

HTCondor can be used to manage a cluster of dedicated computer nodes (such as a "Beowulf" cluster). In addition, unique mechanisms enable HTCondor to effectively harness wasted CPU power from otherwise idle desktop workstations.

For more information on this freely available software, refer to the HTCondor web site:
<https://research.cs.wisc.edu/htcondor/>

Q: Do I have to use HTCondor to take advantage of ERDAS Engine?

A: No. HTCondor is extremely powerful if you want to distribute processing across multiple computers in a cluster. But if you wish to simply take advantage of the processing power of a single computer, you can also easily use the ERDAS IMAGINE Batch interface (or command-line scripting) to initiate simultaneous processing, which is then constrained to run only as many parallel processes as there are ERDAS Engine process (eeprocess) licenses available.

Q: Do I have to use the HTCondor for Hexagon Geospatial installer to provide distributed processing, or can I use an existing HTCondor system?

A: The HTCondor for Hexagon Geospatial installer is simply provided as a convenience to make it easier for Hexagon's Geospatial division customers who have not previously installed or used HTCondor to implement a HTCondor cluster that will work with their purchased products. If you already have an existing HTCondor cluster, you can configure it to work for Hexagon's Geospatial division products too.

Q: Does my Software Maintenance (SWM) contract cover installing, configuring, and troubleshooting HTCondor?

A: No. Hexagon's Geospatial division does not provide assistance with HTCondor except under additional-cost services contracts. Hexagon's Geospatial division SWM covers ERDAS Engine upgrades and support for issues related to the native use of core eeprocess or ERDAS Engine related processes running via local distributed processing only.

Q: If I purchase additional ERDAS Engine licenses can I also use them to run extra seats of ERDAS IMAGINE?

A: No. Purchasing an ERDAS Engine license does not unlock the graphical user interface of ERDAS IMAGINE or IMAGINE Photogrammetry. In the example at the beginning of this document, the disaster relief agency might not necessarily need to quickly perform offline processing of a large amount of data, but might be bringing in volunteer operators to develop and print maps for field personnel. In this instance, the four ERDAS Engines cannot be used by four extra volunteers to run ERDAS IMAGINE. To extend the number of workstations that can start and run ERDAS IMAGINE, the relief agency would need to purchase four IMAGINE Essentials licenses to import and rectify imagery, overlay vector features, and update them and create map compositions for presentations or maps. However, these additional licenses would also make additional ERDAS Engine process licenses available to increase the parallel processing capacity at each computer.

Q: What constitutes a “process” for the purposes of limiting how many can be simultaneously run?

A: In this case, a “process” is generally any ERDAS IMAGINE command that runs in the background, and does not lock the user interface during execution. For example, displaying, enhancing, and roaming imagery in a 2D View does not count as a background process, and therefore does not count toward reducing the number of processes that can be run. Starting a subset, calculating NDVI, performing an unsupervised classification, and extracting a surface model using Auto DTM are all functions that are set up through a user interface. When these processes are launched by clicking the OK button or using the Batch wizard, they run in the background and free up the user interface for further interaction. These types of commands will count toward consuming the number of simultaneous ERDAS Engine processes you can execute.

Q: If I buy IMAGINE Essentials and upgrade to IMAGINE Advantage, do I get four more eeprocess unlocks?

A: No. The current “Upgrade Essentials to Advantage” product only adds the additional licensing tokens (imadvan) to what you already own, and will continue to work this way. If you want additional eeprocess unlocks you must purchase a full IMAGINE Advantage seat license or additional ERDAS Engines.

Q: If a user submits some processing jobs to HTCondor from their local computer but then shuts down their local computer, do the jobs still run?

A: Yes, provided the concurrent licenses are still available and the HTCondor “master node” is still active.

After jobs enter the HTCondor processing queue, they are no longer on the initiating computer / terminal. When the distributed nodes start running the processes they will only need to be able to communicate to the concurrent license server to check out the necessary ERDAS Engine licenses.

Q: What's the best way to set up licensing to take advantage of the processing boost provided by ERDAS Engine?

A: In the case of distributed processing, it is absolutely necessary to use a centralized concurrent license server that contains all the licenses that will be consumed by the nodes (and potentially also those required by the initiating seat computers).

Even for local batch processing there are advantages to using a centralized concurrent license server that stores licenses for all computers. This means that any given computer running ERDAS IMAGINE can run multiple processes, including more than four simultaneous processes if other users aren't using all their current allotment of ERDAS Engine licenses.

Q: Does using a centralized license server mean that any given user could consume more than their "fair share" of simultaneous processing?

A: Yes. Consider an example whereby a company owns two seats of IMAGINE Advantage (and therefore has a maximum of eight ERDAS Engine licenses). If both these seats are licensed via a single concurrent license server, there is the potential for User A to start eight simultaneous processes running in background on their computer, thereby consuming all eight ERDAS Engine licenses. User B can still start and interact with the ERDAS IMAGINE user interface and perform interactive functions. But if User B attempts to start a background process, there will be no ERDAS Engine (eeprocess) licenses available for that process to actually begin processing. The process (not the user interface) will wait until the necessary eeprocess becomes available from the license server and will begin processing at that point.

If this is a concern, your System Administrator can use the FlexNet administration tools to limit the types and quantities of licenses that can be used by individual users or groups.

Q: Can I still request Nodelocked licenses for my software?

A: No. To provide optimal flexibility in the way the software can be used and scaled for varying hardware or Cloud processing capabilities, we began providing only concurrent licenses for Hexagon's Geospatial division software in 2011.

Q: Do applications that are multi-threaded consume extra licenses?

A: No. Running a process that is capable of multi-threading to multiple CPUs or cores still only consumes a single eeprocess license. One process running = one eeprocess license consumed.

Q: Can you use an ERDAS Engine with ERDAS APOLLO?

A: No. ERDAS Engine can only be used to increase the processing capability of desktop products such as ERDAS IMAGINE or IMAGINE Photogrammetry.



Contact us



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About Hexagon

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous — ensuring a scalable, sustainable future.

Hexagon's Geospatial division creates solutions that deliver a 5D smart digital reality with insight into what was, what is, what could be, what should be, and ultimately, what will be.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 20,000 employees in 50 countries and net sales of approximately 4.3bn USD. Learn more at hexagon.com and follow us @HexagonAB.

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