Hardware sizing

Note that:

- hardware requirements depend on various factors related to the Application(s) you are analyzing and these must be considered:
  - Number of lines of code (LOC)
  - Number of objects after analysis
  - Number of violations after analysis
  - Technologies used
  - Number of users accessing results
- due to the different factors that need to be considered, it is difficult to make precise hardware recommendations, therefore what we provide in this page is **indicative** only. We provide these figures as a guide to the **absolute minimum** required to run AIP Console and all required components, and your own configuration will **likely require better hardware**.
- using storage/disk with **high IOPS values** (i.e. SSD disks or SANs configured with SSD) will bring **better performance**. This is particularly true for servers hosting the CAST AIP/AIP Node and CAST Storage Service/PostgreSQL components where faster storage will improve analysis performance.
- installations of CAST AIP on servers with resources that are lower than the minimum required or that barely meet the minimum requirements will have the following limitations:
  - analysis runtime and SQL operations will be sub-optimal
  - you cannot run more than one application in parallel
  - disk space can be quickly overloaded

On-premises

Multi-node (Large/Enterprise)

Component	Server type	Architecture	CPU	RAM	DISK	OS	Notes
AIP Core + AIP Node (back end)	Physical /virtual	64-bit	**Minimum 1 CPU / 2 cores**: • Intel Core i5, 2.6 GHz • Intel Xeon , 2.2 GHz **Recommended 1 CPU / 4 cores**: • Intel Core i7, 2.8 GHz • Intel Xeon , 2.6 GHz	16GB min	256GB (SSD recommended)	Windows	**Disk space** The recommended disk space takes into account space for the following folders hosted on the AIP Node: • Delivery folder • Deploy folder • Log files, • Extensions folder • LISA / LTSA . You can refer to **CAST AIP for Dashboards - Deployment considerations** for more information about this. **RAM** The batch files / Windows Service configurations provided for the AIP Node service are configured by default with **conservative** RAM provisions. See **Configuring RAM for AIP Console front-end and AIP Nodes** for more information about changing these.
AIP Console + Dashboards (front end)	Physical /virtual	64-bit		8GB min	128GB	Windows or Linux	**RAM** The batch files / Windows Service configurations provided for the AIP Node service are configured by default with **conservative** RAM provisions. See **Configuring RAM for AIP Console front-end and AIP Nodes** for more information about changing these.
CAST Storage Service / PostgreSQL	Physical /virtual	64-bit		32GB min	512GB (SSD recommended)	Windows or Linux	CAST highly recommends the use of **PostgreSQL** on a **Linux** instance as this consistently gives the best performance.

CAST RESTAPI (dashboard back end)	Physical /virtual	64-bit	16GB min	128GB	Windows or Linux	
CAST Extend Offline or CAST Extend Proxy (optional)	Physical /virtual	64-bit	4GB min	64GB	Windows	It is possible to re-use one of the existing servers dedicated to the CAST RESTAPI or CAST AIP/AIP Node, providing that this is a **Windows server**, however CAST does recommend a **dedicated server** where possible.

Single server (Small/Testing)

Although it is possible to run all required packages and components from one single Windows server, CAST does not recommend this approach for "production" environments.

Server type	Architecture	CPU	RAM	DISK	OS	Notes
Physical /virtual	64-bit	**Minimum 1 CPU / 2 cores**: • Intel Core i5, 2.6 GHz • Intel Xeon, 2.2 GHz **Recommended 1 CPU / 4 cores**: • Intel Core i7, 2.8 GHz • Intel Xeon, 2.6 GHz	• 8GB min • 32 GB recommended	128GB min (SSD recommended)	Windows	8GB RAM is the absolute minimum requirement to allow all packages and components to function, however, analysis performance will be poor as the available resources will be shared between the AIP Node and the CAST Storage Service.

Example on-premises hardware configuration

Managing multiple applications

If you are managing a large number of applications, we recommend installing multiple AIP Nodes, one node per server to spread the load. The disk space allocated to a single AIP Node obviously depends on the size and the number of applications that will be analyzed by the AIP Node. In a situation where all the AIP Nodes are running analyses, some AIP Nodes may need to run more than one analysis in parallel. To avoid overloading the AIP Node where more than one analysis is running at the same time, we strongly recommend deploying servers with sufficient resources.

To ensure good performance during analysis, we advise, for each application, a memory range between **8 GB RAM** (for small applications) and **32 GB RAM** (for very large applications). Therefore, to analyze up to 50 applications and to run up to 5 analyses in parallel on one single AIP Node with one associated CAST Storage Service/PostgreSQL instance, CAST recommends increasing RAM and DISK resources as follows:

Component	RAM	DISK
AIP Core + AIP Node (back end)	48GB min / 128GB recommended	2TB (SSD recommended)
CAST Storage Service / PostgreSQL	64GB min	3TB (SSD recommended)

You can distribute your applications across multiple CAST Storage Service/PostgreSQL instances, as discussed in **Which deployment architecture should you use?**

Analyzing complex applications

While 90% of JEE, .NET or Mainframe applications can be analyzed with the minimum requirements, some specific (very large or not well balanced) applications require more memory than the minimum recommendations. The following configurations are examples of sizing required for very large applications. The requirements are not a linear function that are based purely on the number of files or lines of code (LoC), instead it is more complex and there is no specific formula to use.

In general, a lack of memory will cause slowness (servers will resort to the use of virtual space) in the best case, and a crash in the worst case. The numbers presented in the table below are purely indicative and depict the varying memory requirements.

> For JEE, it does not include **Security for Java** extension, which has **specific RAM requirements**.

Application	Analysis machine - CPU	Peak RAM used by analyzer	Recommended analysis machine RAM	Disk space
JEE application with 13,000 java files and 6,300 JSP files	2 processors, 4 cores	22 GB	32 GB	256 GB
JEE application with 21,000 java files, 14 JSP files, 2,800 projects		10 GB	16 GB	
JEE application with 30,000 java files and 1,200 JSP files		12 GB	16 GB	
.NET application with 18,785 C# files		12 GB	16 GB	
.NET application with 23,000 C# files and 4,100 cshtml files		20 GB	32 GB	
Mainframe application with 10,000 COBOL programs		2 GB	8 GB	

Cloud services

Multi-node instance (Large/Enterprise) on Amazon Web Services (AWS)

The following requirements are based on CAST's own testing for the analysis of a single "large Application", using **Amazon EC2 R5 Instances**:

Component	Minimum instance type	Volume Size	Volume Type	Minimum IOPS
CAST AIP + AIP Node (back end)	r5.large	128GB	General purpose SSD (gp2) or Provisioned IOPS SSD (io1)	400
AIP Console + Dashboards (front end)	r5.large	256GB	General purpose SSD (gp2) or Provisioned IOPS SSD (io1)	400
CAST Storage Service / PostgreSQL	r5.large	512GB	General purpose SSD (gp2) or Provisioned IOPS SSD (io1)	400
CAST RESTAPI (dashboard back end)	r5.large	256GB	General purpose SSD (gp2) or Provisioned IOPS SSD (io1)	400
CAST Extend Offline or CAST Extend Proxy (optional)	r5.large	128GB	General purpose SSD (gp2) or Provisioned IOPS SSD (io1)	400