package managers
package manager is an tool or utility that helps us in communicating with package repositories in searching, downloading, installing & upgrading the software packages on an linux operating system machine.
every distro vendor providers their own package manager tool/utility allowing us to installing/upgrade a software package on the operating system machine.

by default the distro package manager talks to distro repository in browsing/searching, download/installation/upgradation of software packages.

Every software package repository creates an index listing down all the software packages that are published and available for distribution. So that whenever we ask an package repository for a specific software package, it can look over through the index in quickly finding them.

Every time when we ask package manager to install or search for an software package it has to connect over the network to package repository in identifying the software package. since the job of installing, upgrading and searching for an software packages will be done quite often, it takes too many number of turns in connecting over the network to the repository in searching and locating for a package.

to avoid these network connections in identifying or locating a software package the package managers downloads these package repository indexes and caches them locally on the linux operating system machine itself.

So that always searching and locating the packages will be done locally from cached index itself thus by improving the performance

#1 package repository indexing & caching

#2.
while the software packages are being downloaded from the package repository on the linux operating system machine, there is always a chance where a hacker or intruder might sniff the network channel and replace the s/w package being downloaded with an unwanted software/virus by which the operating system might get effected

To avoid such situations in downloading and installing the un-wanted s/w packages gpg keys are introduced.
gpg stands for “GNU Privacy guard”. there are several uses of GPG keys
1. encryption/decryption
2. verifying the authenticity of the message through signatures
3. checking software authenticity before installing
4. GPG keys are used for sign commits into Git repository