Resolving Rails Gem Installation Issues on Fedora

Overview

When installing Ruby on Rails and its dependencies on Fedora, users often encounter Bundler permission errors. These errors are not bugs but a result of Fedora's strict and secure system design. This document explains why the issue occurs and how to resolve it correctly without damaging your Ruby environment.

What Is Happening

Fedora installs Ruby gems system-wide in the directory **/usr/share/gems**. This directory is owned by the root user and is intentionally protected. When Bundler attempts to install gems into this directory while running as a normal user, Fedora blocks the operation, resulting in a **Bundler::PermissionError**. This behavior is correct and expected on Fedora.

What You Should NOT Do

You should never attempt to fix this problem by running **sudo bundle install**. Doing so installs gems as root, mixes system and user dependencies, and can permanently break your Ruby and Rails setup.

Recommended Solution (Best Practice)

The safest and most recommended solution is to install gems locally within your project. From your Rails project directory, run the following commands:

bundle config set --local path vendor/bundle
bundle install

This installs all gems into the **vendor/bundle** directory inside your project. This approach avoids root permissions, prevents system pollution, and works perfectly on Fedora. Afterward, always run Rails commands using **bundle exec**.

Alternative Solution (User-Level Gems)

Another valid approach is to configure Ruby to install gems into your home directory. Run the following commands once:

export GEM_HOME="$HOME/.gem"
export PATH="$HOME/.gem/bin:$PATH"

After applying these settings, reinstall Bundler and run **bundle install**. Gems will be installed under **~/.gem**.

Verification Steps

To confirm the issue is resolved, run **bundle env** and ensure that **/usr/share/gems** is no longer listed as the install path. Then verify Rails with **bundle exec rails -v**.

Why Fedora Behaves Differently

Fedora ships with a system-managed Ruby installation and enforces strict file permissions. This design encourages user-level or project-level dependency management. Operating systems like macOS and Ubuntu often mask these issues, but Fedora exposes them clearly to promote best practices.

Final Recommendation

For long-term Rails development on Fedora, it is strongly recommended to either use a Ruby version manager such as **rbenv** or **asdf**, or consistently install gems using a project-local bundle. Following these practices prevents the majority of Ruby-related issues on Fedora.