

Question Bank for Opensource Software Paradigms

Section 1: Multiple Choice Questions (MCQs)

1. What is the primary philosophical focus of the "Free Software" movement, as defined by Richard Stallman?
 - a) Improving software quality through collaboration
 - b) Making software available at no cost
 - c) Protecting the commercial interests of software vendors
 - d) Ensuring user freedom and ethical computing
2. The freedom to run a program for any purpose is known as:
 - a) Freedom-0
 - b) Freedom-1
 - c) Freedom-2
 - d) Freedom-3
3. The Open Source Initiative (OSI) was founded primarily to:
 - a) Enforce the principles of free software legally.
 - b) Provide a more business-friendly alternative to the term "free software."
 - c) Develop a completely free Unix-like operating system.
 - d) Create the first version of the Linux kernel.
4. Which of the following best describes the "Economic Paradox" of Open Source Software?
 - a) High-quality software cannot be developed by volunteers.
 - b) It is difficult to collaborate with developers from around the world.
 - c) How giving away a valuable product (code) for free can be sustainable.
 - d) Open source software is always more expensive in the long run.
5. A company offers a core software product as open source but keeps advanced enterprise features proprietary. This is an example of which business model?
 - a) Dual Licensing
 - b) Support & Services
 - c) Open Core
 - d) SaaS/Subscription

6. According to the Open Source Definition (OSD), what must be allowed for a license to be considered "open source"?
- a) The author must be paid royalties.
 - b) The license must be specific to a particular product.
 - c) The source code must be available.
 - d) The software cannot be used for commercial purposes.
7. The MIT and Apache 2.0 licenses are classic examples of:
- a) Copyleft Licenses
 - b) Proprietary Licenses
 - c) Trademark Licenses
 - d) Permissive Licenses
8. What is the core philosophy behind a Copyleft license like the GPL?
- a) "Do what you want, just give credit."
 - b) "You can use and modify, but you must share your changes under the same terms."
 - c) "This software cannot be used for commercial purposes."
 - d) "This software is free for personal use only."
9. The AGPL (Affero GPL) is distinct from the GPL because it:
- a) Is a permissive license.
 - b) Explicitly grants patent rights to users.
 - c) Triggers source code sharing requirements for software provided as a service (SaaS).
 - d) Forbids any commercial use.
10. What is the primary purpose of a Contributor License Agreement (CLA)?
- a) To pay the contributor for their work.
 - b) To ensure the project has the necessary rights to use the contribution, protecting its IP chain.
 - c) To prevent contributors from working on competing projects.
 - d) To transfer the copyright of the contributor's other projects.

11. Which open-source database is known as a robust, ACID-compliant SQL relational database?

- a) MongoDB
- b) Redis
- c) PostgreSQL
- d) Neo4j

12. The "Cathedral" development model is characterized by:

- a) Frequent, small releases and community-driven governance.
- b) Centralized, planned development and infrequent, large releases.
- c) A decentralized and chaotic process.
- d) Being the model used for the Linux kernel.

13. What is the first step a contributor typically takes in the standard Git workflow to contribute to a project on GitHub?

- a) Open a Pull Request
- b) Clone the repo locally
- c) Fork the repo on GitHub
- d) Create a new branch

14. Which of the following is a NON-code contribution to an open-source project?

- a) Refactoring the codebase
- b) Writing unit tests
- c) Triaging issues and improving documentation
- d) Implementing a new feature

15. The Open Source Security Paradox refers to the idea that:

- a) Open source software is inherently less secure than proprietary software.
- b) Transparency allows for community auditing (a strength) but also exposes vulnerabilities to attackers (a weakness).
- c) Security through obscurity is the best practice.
- d) Only proprietary software can be truly secure.

16. What does SBOM stand for in the context of the OSS security lifecycle?
- a) Software Build and Operation Module
 - b) Secure Base for Open-source Management
 - c) Software Bill of Materials
 - d) Security Backdoor Obfuscation Method
17. A "Dependency Confusion" attack involves:
- a) A developer misspelling a package name when installing it.
 - b) A malicious public package being used instead of a similarly named internal private package.
 - c) A project maintainer abandoning a critical project.
 - d) An open-source license being violated.
18. A key legal challenge with Open Source AI involves:
- a) Determining if an AI model itself is considered "source code" and what license applies.
 - b) The inability of AI to write code.
 - c) All AI models are automatically considered proprietary.
 - d) Open source licenses do not apply to machine learning.
19. If a company uses a GPLv3-licensed library in their web application (SaaS), what is their obligation under the license's AGPL-like provisions?
- a) They must pay a fee to the original author.
 - b) They have no obligations because the software is not distributed.
 - c) They must release the source code of their application under GPLv3.
 - d) They must switch to a proprietary license.
20. Which open-source office suite is noted for its native support of the Open Document Format (ODF)?
- a) Microsoft 365
 - b) Google Workspace
 - c) LibreOffice
 - d) Adobe Acrobat

Section 2: True/False Questions

1. The terms "Free Software" and "Open Source Software" can be used interchangeably because they describe the exact same concept and philosophy.
2. The "SaaS/Subscription" business model for open-source software involves selling the source code directly to enterprises.
3. A software license that forbids use for military purposes would be considered "Open Source" according to the Open Source Definition (OSD).
4. The "Bazaar" development model is characterized by centralized, planned development and infrequent, large releases.
5. The main purpose of a Software Bill of Materials (SBOM) is to provide a list of all open-source and third-party components used in an application to help manage security risks.

Section 3: Short Answer Questions

1. Briefly explain the core difference in philosophy between the "Free Software" movement and the "Open Source" movement.
2. What is the fundamental difference in requirement between a Permissive license (like MIT) and a Copyleft license (like GPL)?
3. Name the four essential freedoms of "Free Software" according to the Free Software Foundation.
4. What is the primary purpose of the "Open Core" business model, and how does it work?
5. What are the two key aspects of the "Open Source Security Paradox"?

Section 4: Practical/Scenario-Based Questions

1. The Startup's License Dilemma

A startup, "CloudAnalytics Inc.," is building a proprietary data visualization platform. They want to use a powerful charting library licensed under the GNU GPL v3. If they integrate this library directly into their platform's backend, what are their obligations under the GPL v3 license? What would be a safer licensing alternative for them to look for?

2. The Abandoned Project

"SecureCode," a popular GPL-licensed library for encrypting data, has been abandoned by its maintainer. A critical security vulnerability (CVE) has been discovered in it. As a developer who relies on this library, what are your two main courses of action to address this security risk?

3. The Business Model Pitch

"AppFast," a new startup, has created a revolutionary open-source tool that automates mobile app deployment. They give the core tool away for free. How can they build a sustainable business around it? Propose two distinct open-source business models they could adopt and briefly explain how each would generate revenue.

4. The Contribution

Maria found a bug in an open-source project on GitHub, fixed it, and wants to contribute the fix back. List the key steps she should follow in the standard Git workflow to get her fix merged into the main project.

5. The Enterprise Migration

A large hospital is considering migrating its desktop operating systems from Microsoft Windows to Ubuntu Linux to reduce licensing costs. The CIO is concerned about "hidden costs." Beyond the cost of the software itself, what are two major categories of costs the hospital must budget for in this migration?

Answer Key

Section 1: MCQs

1. **d)** Ensuring user freedom and ethical computing
2. **a)** Freedom-0
3. **b)** Provide a more business-friendly alternative to the term "free software."
4. **c)** How giving away a valuable product (code) for free can be sustainable.
5. **c)** Open Core
6. **c)** The source code must be available.
7. **d)** Permissive Licenses
8. **b)** "You can use and modify, but you must share your changes under the same terms."
9. **c)** Triggers source code sharing requirements for software provided as a service (SaaS).
10. **b)** To ensure the project has the necessary rights to use the contribution, protecting its IP chain.
11. **c)** PostgreSQL

12. **b)** Centralized, planned development and infrequent, large releases.
13. **c)** Fork the repo on GitHub
14. **c)** Triaging issues and improving documentation
15. **b)** Transparency allows for community auditing (a strength) but also exposes vulnerabilities to attackers (a weakness).
16. **c)** Software Bill of Materials
17. **b)** A malicious public package being used instead of a similarly named internal private package.
18. **a)** Determining if an AI model itself is considered "source code" and what license applies.
19. **c)** They must release the source code of their application under GPLv3.
20. **c)** LibreOffice

Section 2: True/False

1. False
2. False
3. False
4. False
5. True

Section 3: Short Answers

1. The core difference is that "Free Software" is a social and ethical movement focused on user freedom and rights, whereas "Open Source" is a development methodology focused on the practical benefits of collaboration, transparency, and producing better-quality software.
2. A Permissive license allows users to do almost anything with the code, including incorporating it into proprietary software, with minimal restrictions (like giving credit). A Copyleft license allows use and modification but requires that any distributed derivatives

are released under the same license terms, thus preserving the "free" status of the software.

3. The four essential freedoms are:

- Freedom 0: The freedom to run the program for any purpose.
- Freedom 1: The freedom to study how the program works and change it.
- Freedom 2: The freedom to redistribute copies.
- Freedom 3: The freedom to distribute copies of your modified versions.

4. The primary purpose of the "Open Core" model is to create a sustainable business around open-source software. It works by offering a core version of the software as open source (to build a community and drive adoption) while keeping advanced features, enterprise functionality, or management tools proprietary and available only under a paid license.

5. The two key aspects are:

- **Strength:** "Given enough eyeballs, all bugs are shallow." Public code allows for extensive peer review by the community, leading to more secure software.
- **Weakness:** The same public transparency makes it easier for malicious actors to find and exploit vulnerabilities in the code..

Section 4: Scenario-Based Answers

1. The Startup's License Dilemma

- **Obligations:** By integrating the GPL v3 library directly into their backend, they are creating a derivative work. The GPL v3 requires that if they distribute the software, they must release the entire platform's source code under GPL v3. Furthermore, if they provide the platform as a SaaS, the license's conditions could be triggered, potentially forcing them to release the source code anyway. This would make their core platform proprietary.
- **Safer Alternative:** They should look for a similar charting library released under a **permissive license** like the MIT or Apache 2.0 license. These licenses allow them to integrate the library into their proprietary software without any obligation to open-source their own code.

2. The Abandoned Project

- **Course of Action 1: Fork and Fix.** The community can fork the "SecureCode" project on a platform like GitHub. Developers can then collaborate on the fork to patch the vulnerability and release a new, secure version. Users can then update their dependencies to point to the new, maintained fork.
- **Course of Action 2: Replace and Migrate.** The developers can search for an alternative, actively maintained library that provides similar functionality (preferably with a compatible license) and migrate their codebase to use this new, secure dependency.

3. The Business Model Pitch

- **Model 1: Open Core.** AppFast can keep the core deployment tool open source and free. They can then develop and sell proprietary "enterprise" features, such as advanced security controls, compliance reporting, or dedicated support, to larger companies.

- **Model 2: SaaS/Subscription (Hosted Service).** AppFast can offer a fully hosted and managed version of their tool as a web service. Customers pay a monthly or annual subscription fee to use the service without needing to install, configure, or maintain the software themselves, thus capturing value through convenience and operational management.

4. The Contribution

1. **Fork** the original project repository on GitHub to her own account.
2. **Clone** her forked repository to her local machine.
3. **Create a new branch** for her bug fix (e.g., fix-login-bug).
4. **Make the changes** (fix the bug) and **commit** them with a clear, descriptive message.
5. **Push** the new branch with the commit to her fork on GitHub.
6. **Open a Pull Request (PR)** from her branch to the main branch of the original project.
7. Participate in the **code review** process, discussing and making any requested changes.
8. Once approved, a project maintainer will **merge** her Pull Request.

5. The Enterprise Migration

- **Cost 1: Training and Change Management.** The hospital will need to invest significantly in training its staff—from doctors and nurses to administrative personnel—to use the new Ubuntu Linux system and alternative software like LibreOffice. This loss of productivity during the learning curve is a major cost.
- **Cost 2: Support and Maintenance.** While the software is free, the hospital will need to either hire in-house IT staff with Linux expertise or pay for a professional support contract (e.g., from Canonical for Ubuntu Advantage) to handle technical issues, updates, and security, which were previously may have been covered by the Microsoft license.