OpenJS World

@

THE LINUX FOUNDATION
OPEN SOURCE SUMMIT
NORTH AMERICA

Responsible use of Node.js & Open Source Software

Best Practices at an Enterprise Level

#ossummit @shusak

THE LINUX FOUNDATION

Responsible use of Node.js & Open Source Software

Best Practices at an Enterprise Level

Stephen Husak
Distinguished Engineer


@shusak


stevehusak

Who Am I?

Steve Husak
Distinguished Engineer

- Joined Capital One in 2014
- Intent Lead for Node.js/JavaScript for Capital One
- Solution Architect in the Commercial Banking space over Capital One's underwriting and loan servicing platform
- Previously led the redesign and architecture of Capital One's credit card contact center software
- Passionate around developer experience and engineering standards

Capital One

@shusak

stevehusak

What’s in your wallet?

Capital One

- United States based bank with presence in UK and Canada
- Credit Cards, Retail & Commercial Banking, Auto Finance
- Tech-first company
- Our mission is to “Change Banking for Good”

Capital One

@shusak

stevehusak

Open Source Software

COMMITMENT TO COMMUNITY

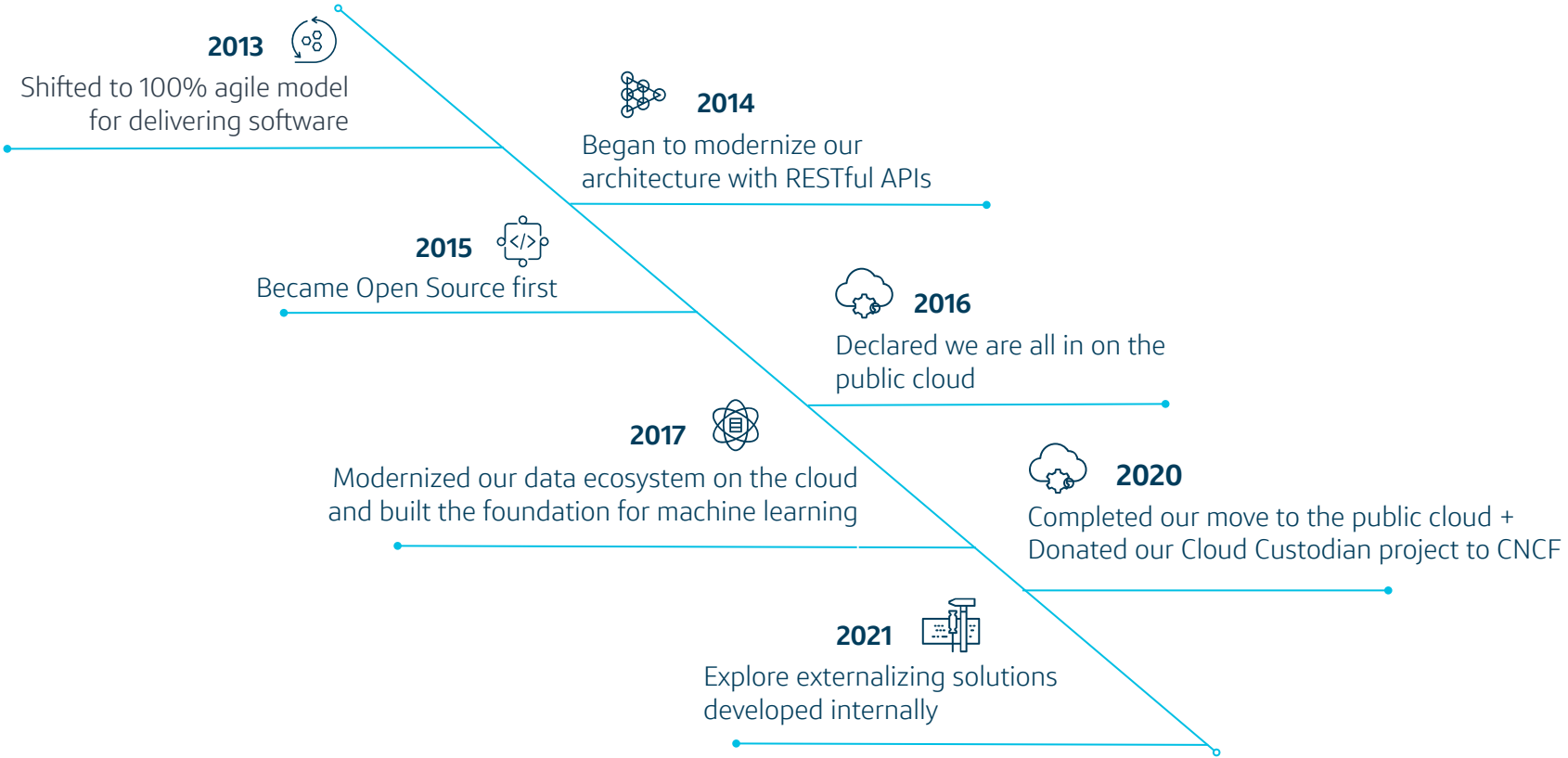
Capital one made an “open source first” declaration in 2014 and that’s when we made our first contributions to the open source community.

- We sponsor FINOS, OpenJS, Python, Continuous Delivery and the Cloud Native Computing Foundations to help keep open source sustainable
- Capital One’s contributions to the open source community have been significant and we've released more than 40 of our own software projects
- We’ve invested for years to build the culture and governance required to be open source-first in a highly regulated industry

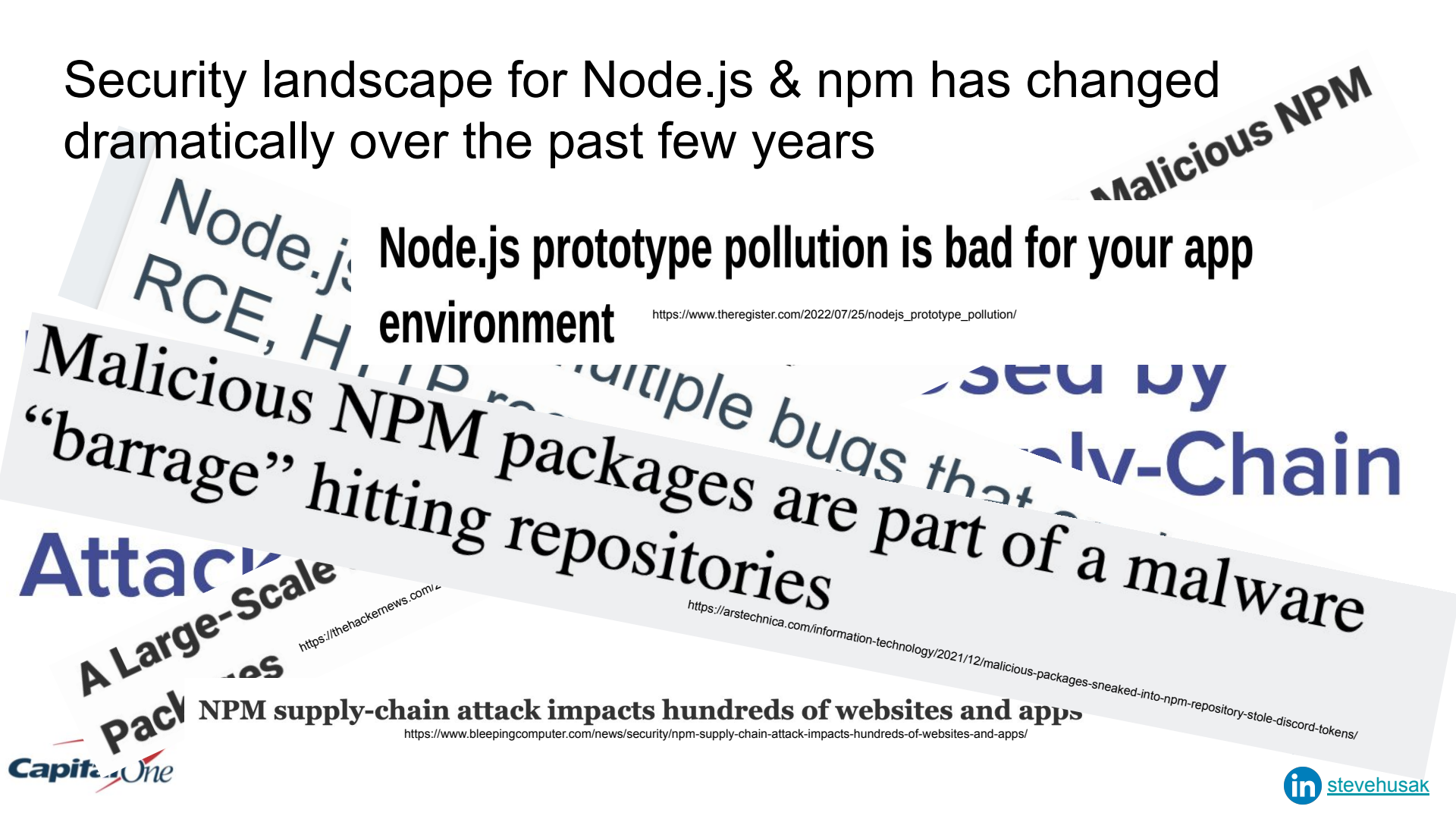
Featured Open Source Projects: Data Profiler, Rubicon-ML and Hygieia

Capital One

Capital One's technology transformation



Security landscape for Node.js & npm has changed dramatically over the past few years



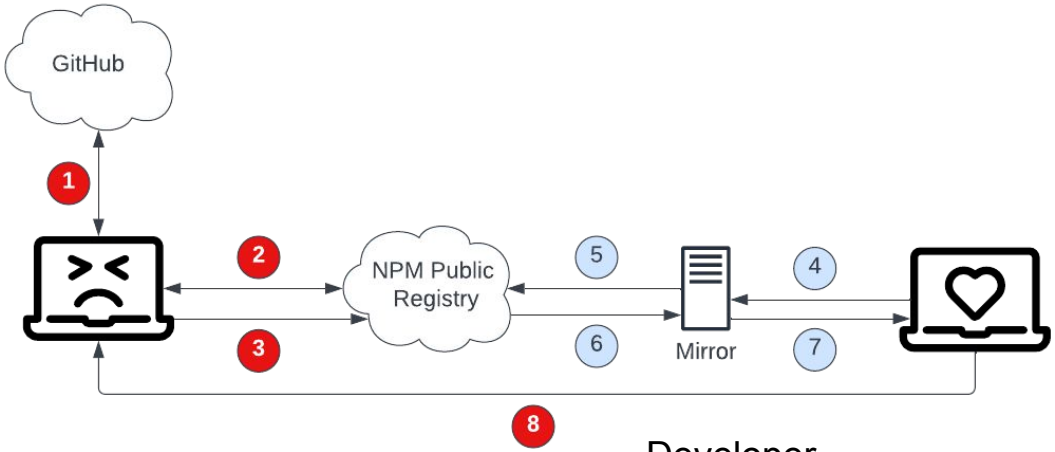
stevehusak

Attacking npm Packages
Classes of attacks

Type	Description
Cryptojacking	Code is inserted to use computing resources to mine for crypto currencies (E.g. ua-parser-js)
Typosquatting	Utilizes common misspellings of popular packages to install malicious code (E.g. react-model vs. react-modal)
Dependency Confusion (Substitution Attacks)	These can occur when a project relies on private packages from an internal registry and attacker published same named package on external registry
Data harvesting	Code executed on install or invocation scrapes local computer environment and sends data to hacker
Ransomware	Code is blocked from executing until other conditions are met
Hijacking	Account or code to publish modules is compromised and tampered with to distribute malicious intent
Author's own attacks (Denial of Service)	Authors publish nefarious versions to block usage for payment demands and/or to promote political views (E.g. node-ipc, colors, faker)

Example of a Supply Chain Attack

Substitution Attack



Attacker

1. Finds package.json files that reference unscoped packages on github.com
2. Verifies packages don't exist on npm public registry
3. Publishes modified package incrementing version on npm public registry
8. Malicious code does its work

Developer

4. Queries local mirror for latest version
5. Mirror determines that latest version is on npm public registry
6. Mirror pulls and caches latest version overwriting legitimate version
7. Receive malicious version

More details on this type of attack: https://medium.com/@alex.birsan/dependency-confusion-4a5d60fec610

@shusak
stevehusak

Reduce Risks by being Well-Managed

- Be intentional on the usage of Node.js
- Use “Golden” Images
- Centers of Excellence can help drive culture of responsible use
- Track package usage through SBOMs
- Push “left” the detection of vulnerable versions and block releases at appropriate CVE levels
- Adopt best practices around security, training, and usage of all components in the software lifecycle

💡Tip: Metrics and associated dashboards can help raise the visibility of your security stance.

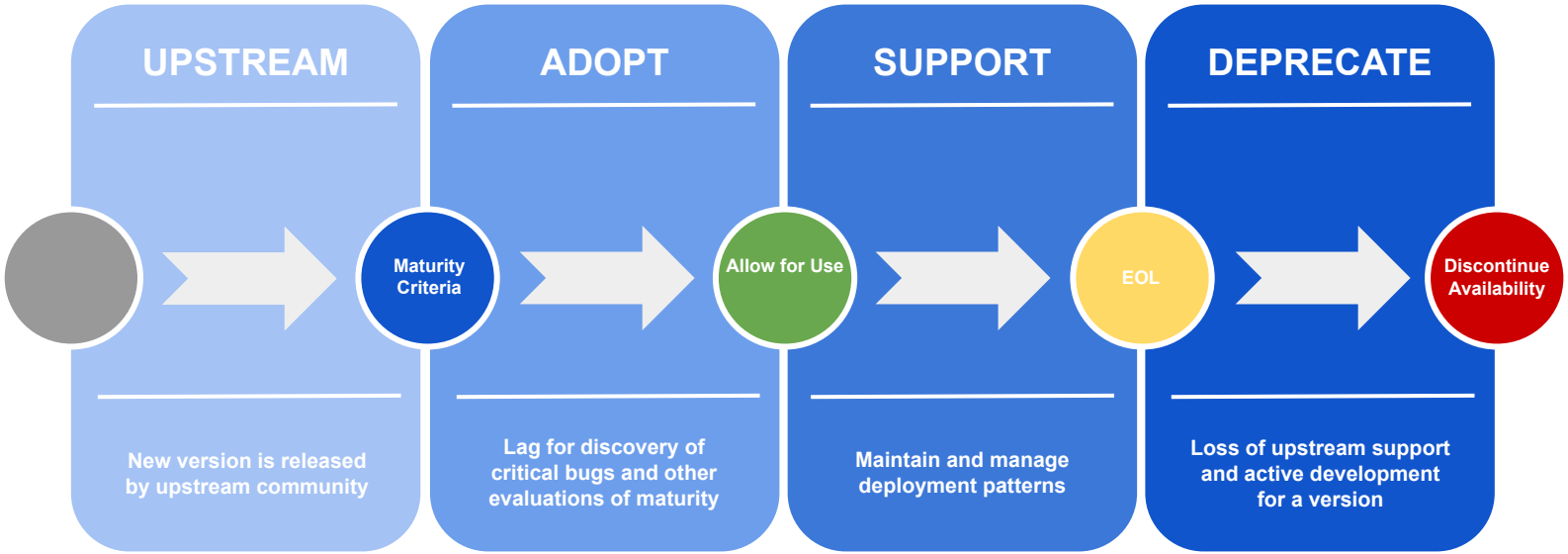
Capital One

@shusak

stevehusak

Be Intentional on Node.js Version Usage

The life cycle stages of version acceptance



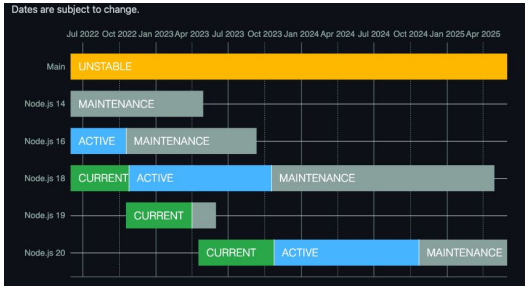
@shusak

stevehusak

Be Intentional on Node.js Version Usage

Defining the “Maturity Criteria” to be used

- Only consider LTS versions
  - Only consider Active and Maintenance, prefer Active whenever possible
- Accept Security Releases on day of release
  - These supersede all previous releases in a particular LTS line
- Lag Minor releases by 2 weeks
  - Allow for discovery of critical issues immediately after release
- Move to Major releases (new LTS) when LTS is declared
  - Lag is built into the Current -> Active release cycle by Node.js itself but sometimes libraries can still lag
- Deprecate on Node.js schedule
  - Non-negotiable - plan ahead to move to new version ***before*** EOL dates



Capital One

💡 Tip: Node.js publishes their release schedule here

@shusak
stevehusak

Use “Golden Images”

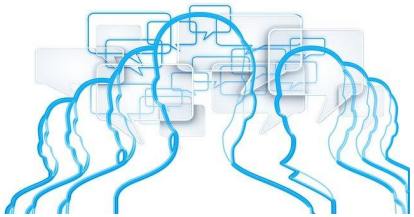
- Golden images (usually Docker containers) are centrally owned & built
- Golden images have no known vulnerabilities at the time of building
- Centrally hosted and the basis for downstream container images
- Continuously updated for base OS specific vulnerabilities
- Updated with Node.js based on maturity criteria
- Configured for Enterprise use and compliance

💡Tip: Consider Distroless images to decrease vulnerability surface and associated maintenance of containers

Capital One

@shusak
stevehusak

Node.js/JavaScript Center of Excellence



- The group meets on a regular cadence
- The main goal of the CoE is to govern and recommend best practices and policies for using Node.js, and by extension, JavaScript within the enterprise
- The CoE is made up of subject matter experts (SMEs) from across the Enterprise. For fair representation, the center has at least one member from each major platform or application utilizing Node.js and/or JavaScript

Main Responsibilities of the Center of Excellence

- Approves Node.js versions as they are released as part of the Open Source Version Life Cycle Management process, following the maturity criteria
- Generates policy in conjunction with the Open Source Program Office (OSPO) for responsible Node.js and JavaScript usage across the Enterprise
- Drives any Node.js or JavaScript specific Enterprise Tech Backlog (ETB) items relating to policy adherence as needed
- Promotes the safe and responsible usage of Node.js, JavaScript, and associated open source modules within Capital One
- Provides SMEs for code reviews for any public-facing open source projects written using JavaScript
- Promotes contributions to Node.js itself, or Node.js and JavaScript open source modules external to Capital One
- Drives the automation of language version approvals and management of Node.js or JavaScript based Community Images
- Works with the appropriate groups within the enterprise to drive for standard ways of consuming and utilizing Node.js that fit within enterprise systems (and attempt to adhere to industry standard best practices)
- Owns the npm public registry presence of Capital One at https://www.npmjs.com/~cof_official

Track Package Usage

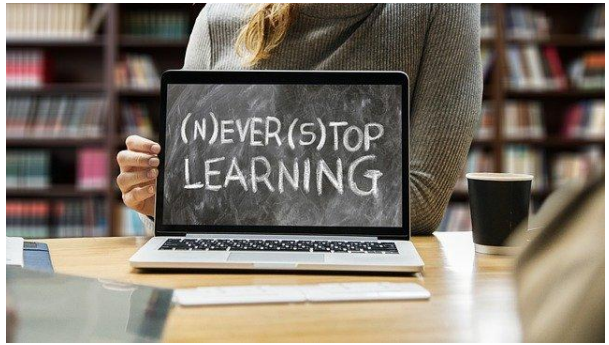
A Software Bill of Materials (SBOM) helps audit usage

- SBOMs should be tracked for each release
  - Required artifact for a release
- Provides a “usage” lineage that can assist in vulnerability detection
- Allows for auditability of software releases
- Helps provide visibility to what is in use and for determining frequency of use across an Enterprise when aggregated reporting is in place
- Assists in the detection of unsanctioned use and/or remediation activities related to vulnerabilities, licensing, or deprecations

Developers should be educated

Code safely and responsibly

- *Continuously* invest in your development (and your developers) around security best practices in the code you write
- Beware of the top ten OWASP (https://owasp.org/www-project-top-ten/) and the common remediations
- Be aware that the security landscape changes constantly
- Keep dependencies up-to-date



Capital One

@shusak

stevehusak

Evaluate packages before use

Tools and processes can assist in detecting issues early

- Train developers on look-up services before adding dependencies into their projects (I.e. basic due diligence)
  - npm public registry, Socket, Snyk, CVE Details, etc.
- Evaluate packages through release cadence, GitHub issues, maintainability, etc. before bringing them into a project
- Use industry standard tools to scan dependencies

Capital One

💡 Tip: Block releases when standards are not met or level of CVE exceeds thresholds!

@shusak
stevehusak

Use tools whenever possible

To reduce developer toil, push detection “left” as much as possible

- Besides scanning for vulnerable packages, scanning for code through static code analysis is just as important
- Use linting to capture before code is even submitted to source control
- Use tools integrated into GitHub to block PRs based on static code scan results
- Use other scanning tools that help auto-remediate or discover issues early in the coding lifecycle
- Use dependency tools to automatically handling of dependency updates
    - Dependabot, Snyk.io, etc.

Capital One

💡Tip: You must have ***reliable*** automated testing in place to trust automation!

@shusak

stevehusak

Npm Package Developer Best Practices

Developers can protect themselves to a degree

- Use only trusted packages (although these have been taken over the past)
- Lock versions using the correct syntax in the package.json and use lock-files appropriately
- Monitor network and process activity on Node.js processes
- Don’t publish private code on external GitHub public repositories
- For produced packages, apply owned scope to all internal/externally published packages

Capital One

💡 Tip: The OpenSSF npm Best Practices Guide contains additional and more detailed guidance.

@shusak

stevehusak

Npm Package Publishing Best Practices

The public registry is doing a lot but you can do more!

- Setup 2FA on the public npm registry for publishing
- Create and own your organization on the registry (there are ways to “reclaim” if it is already taken)
- Use scoped packages (if possible)

💡Tip: The OpenSSF npm Best Practices Guide contains additional and more detailed guidance.

Capital One

@shusak

stevehusak

In Summary

- The vulnerability landscape changes constantly
- Be well-managed to reduce risk
- Keep your developers up-to-date on security practices and responsible usage
- Have reliable and automated testing to trust the tools that help reduce developer toil
- Use dashboarding and monitoring to get a holistic view of your own usage
- Follow the recommendations by npm/OpenSSF on publishing of both internal and external packages

@shusak
stevehusak

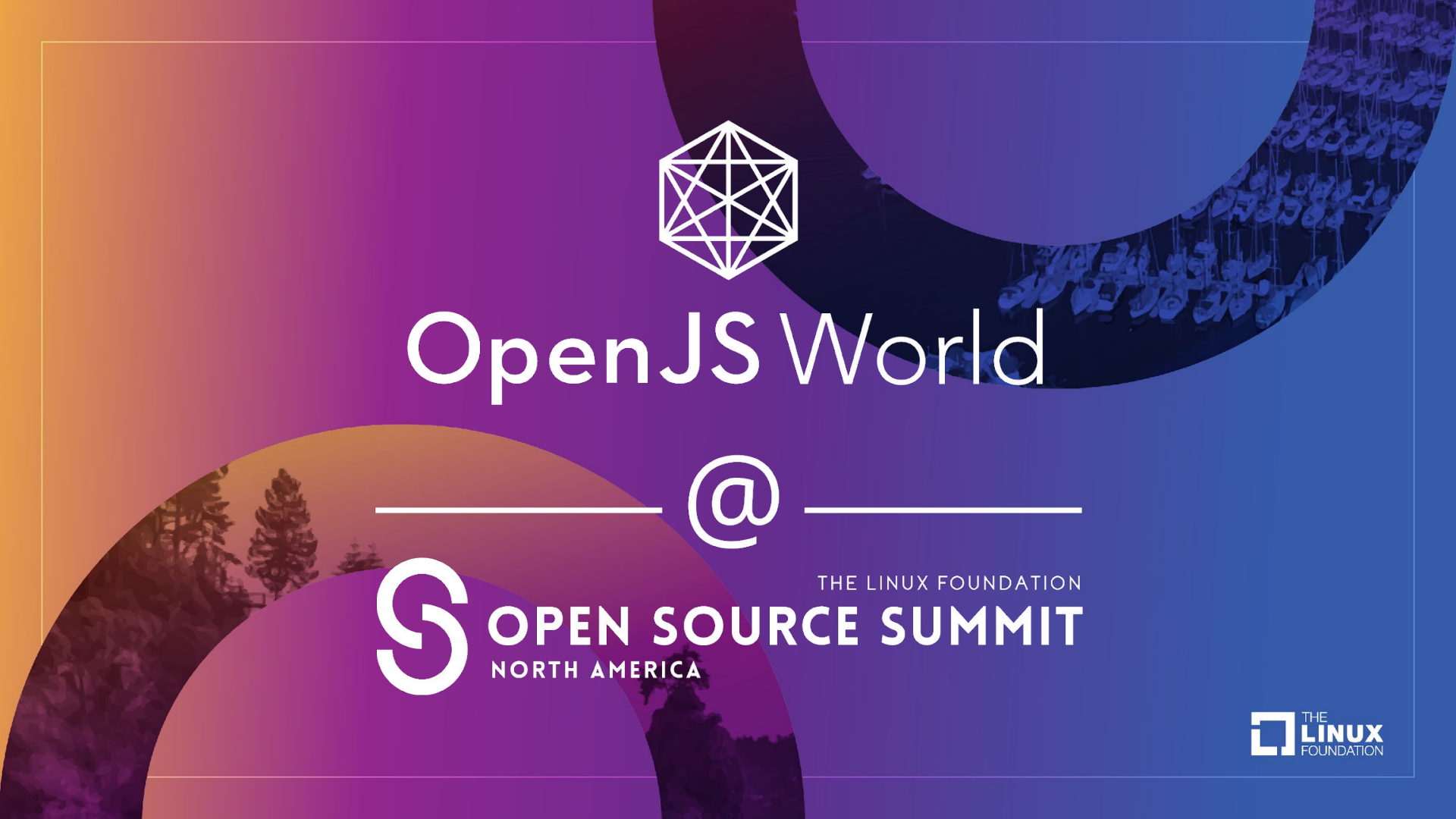
Want to learn more?

- Want to learn more about our Tech? Check out Capital One Tech to find out more about enterprise software solutions, ideas and stories.
- At Capital One, we celebrate and honor the differences that makes us all unique- inside and outside of work. Help us create a more equitable future for all! Join us! Visit Capital One Careers to view our open roles.
- Follow us on Twitter at CapitalOneTech

Thank you!

Contact Me:

LinkedIn: https://www.linkedin.com/in/stevehusak/
Twitter: @shusak
Email: stephen.husak@capitalone.com
Slides: https://github.com/shusak/openjs2023


OpenJS World
@
THE LINUX FOUNDATION
OPEN SOURCE SUMMIT
NORTH AMERICA
THE LINUX FOUNDATION