
# 25 Years of Vulnerabilities: 1988-2012

## *Past, Present and Future*

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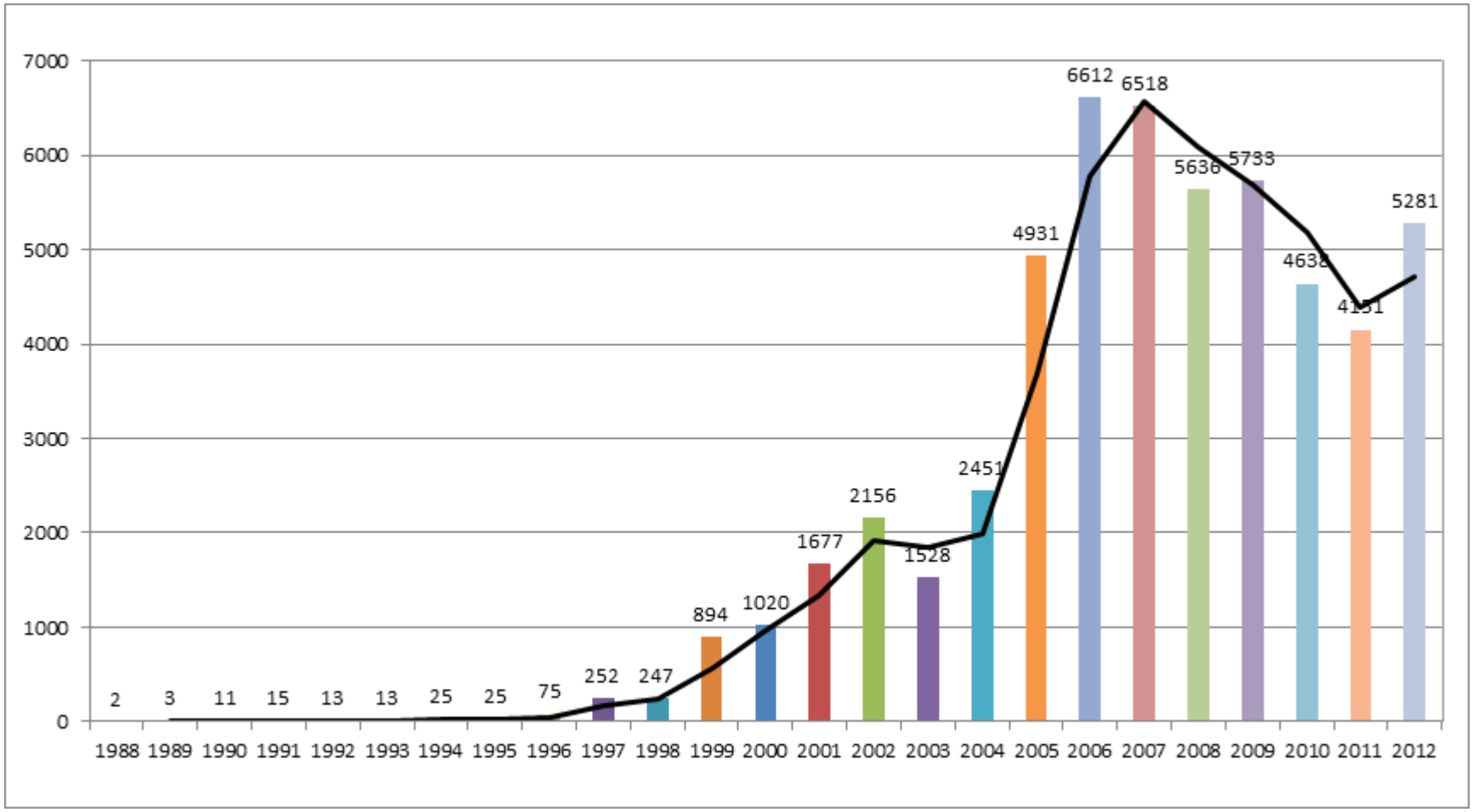
# Overview

- A look at 25 years of past vulnerabilities
  - Based on the CVE/NVD data.
  - CVE started in 1999, but includes historical data going back to 1988.
  - NVD hosts all CVE information in addition to some extra data about vulnerability types, etc.
- A look at the present
  - First six weeks of 2013
- A look at the future
  - What trends do we expect?

# Vulnerabilities Past

- Data from 1988-2012
  - More than 54,000 vulnerabilities in this period
  - Majority of vulnerabilities in the last half of this period
  - Common Vulnerability Scoring System (CVSS) scores for vulns gives info on seriousness of vulns
  - We use the following in the stats:
    - CVSS >=7 is considered a serious vulnerability
    - CVSS = 10 is considered a critical vulnerability
      - Note: if insufficient information is available, NVD will consider the vulnerability to be critical

# Total Vulnerabilities by Year



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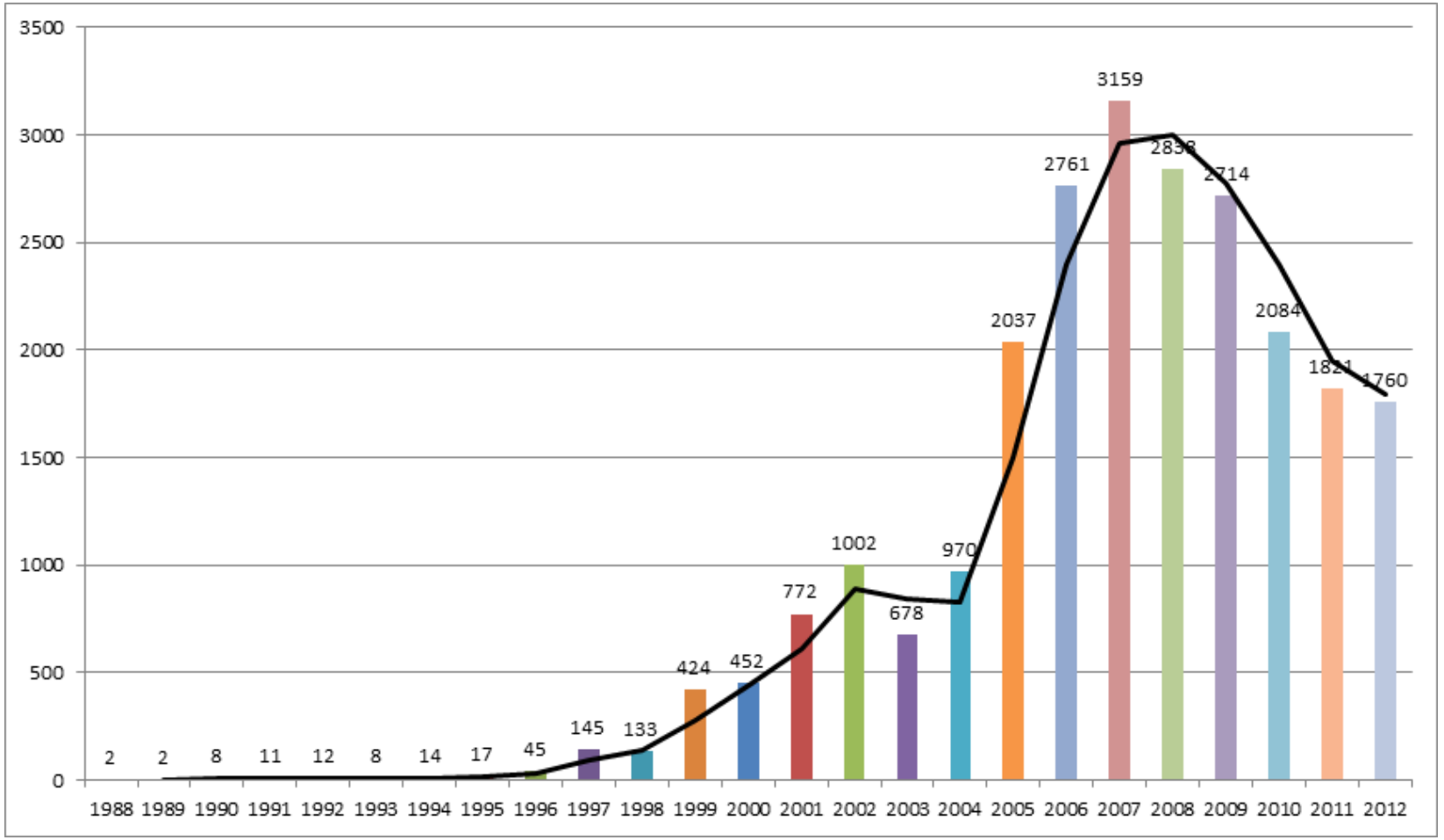
# Total Serious Vulnerabilities



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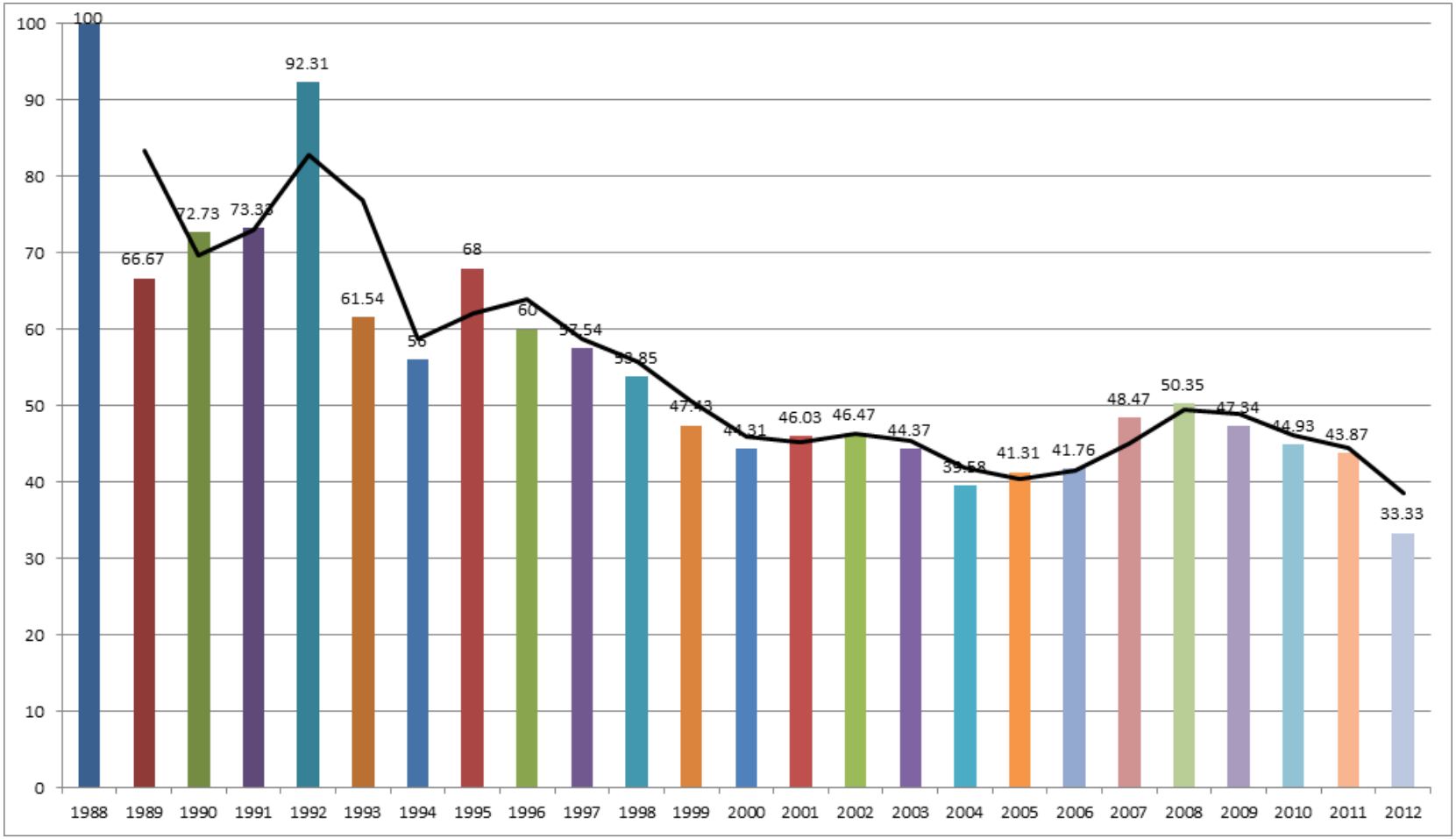
# Serious Vulns Percentage of All Vulns



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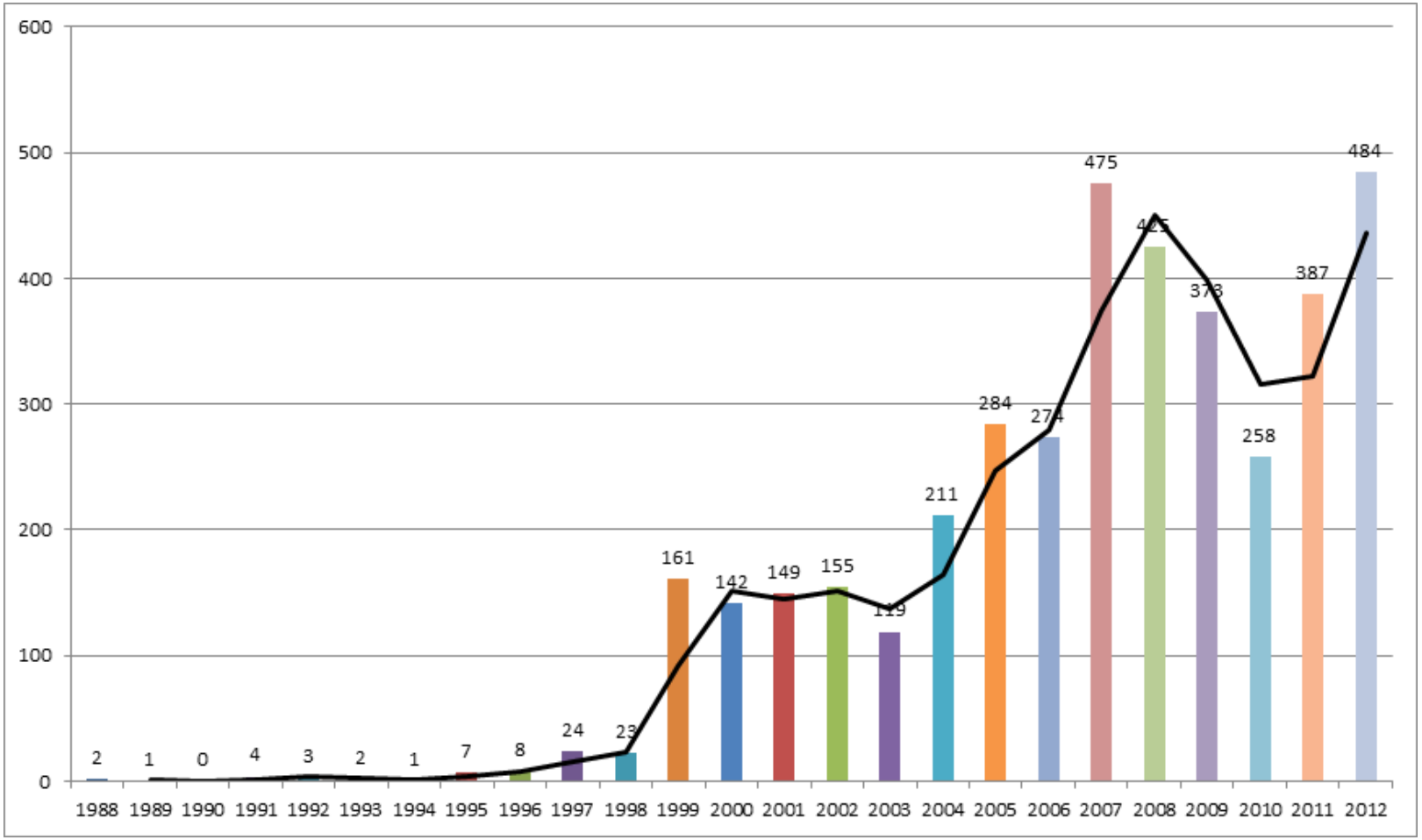
# Total Critical Vulnerabilities



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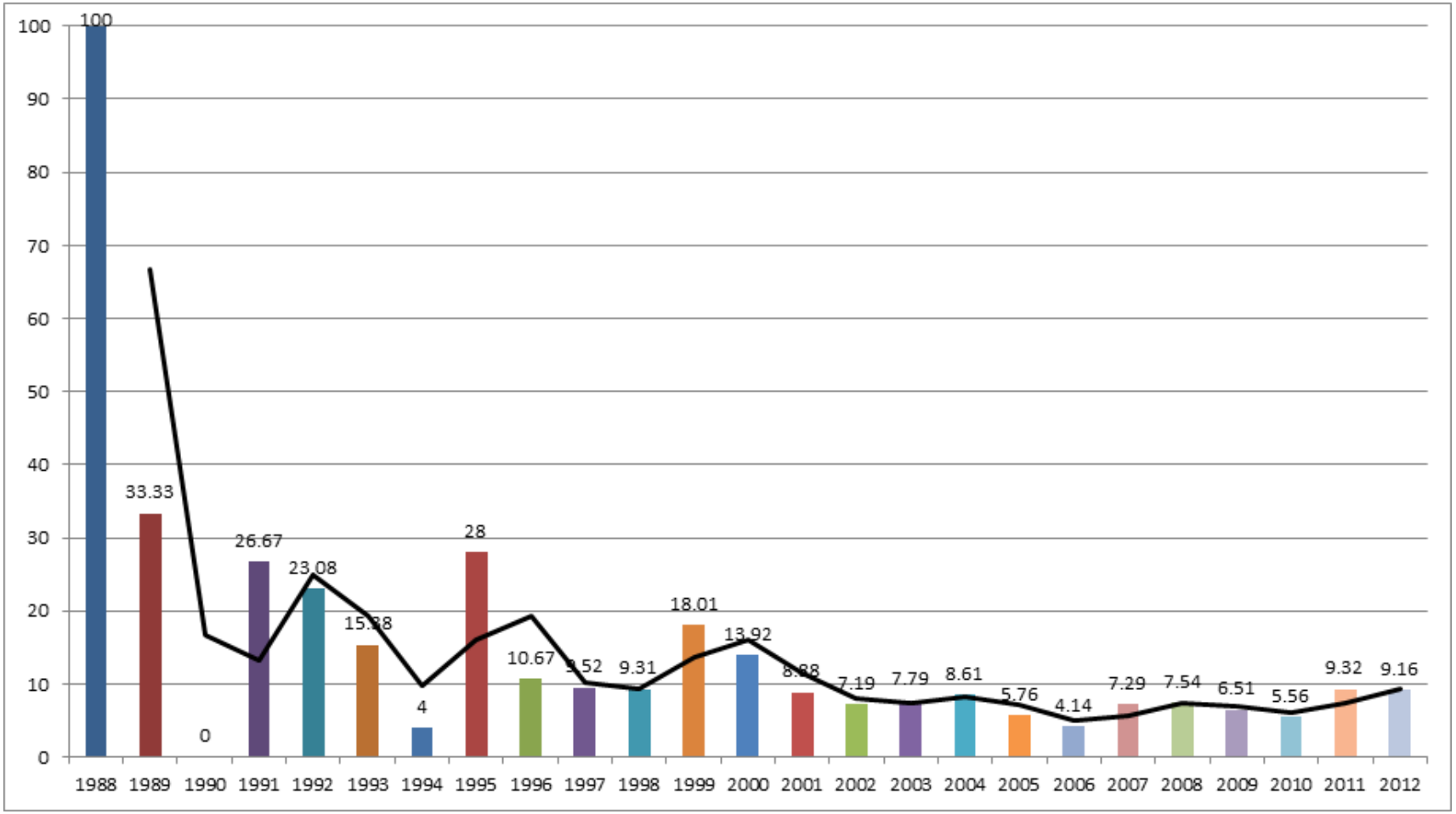
# Critical Vulns Percentage of All Vulns



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# Vulnerabilities by Type

- Common Weakness Enumeration creates a number of categories for vulnerabilities
- NVD uses a subset of CWE to categorize vulnerabilities:
  - Authentication issues: not properly authenticating users
  - Credentials management: password/credential storage/transmission issues
  - Access Control: permission errors, privilege errors, etc.
  - Buffer error: buffer overflows, etc.
  - CSRF: cross-site request forgery
  - XSS: cross site scripting

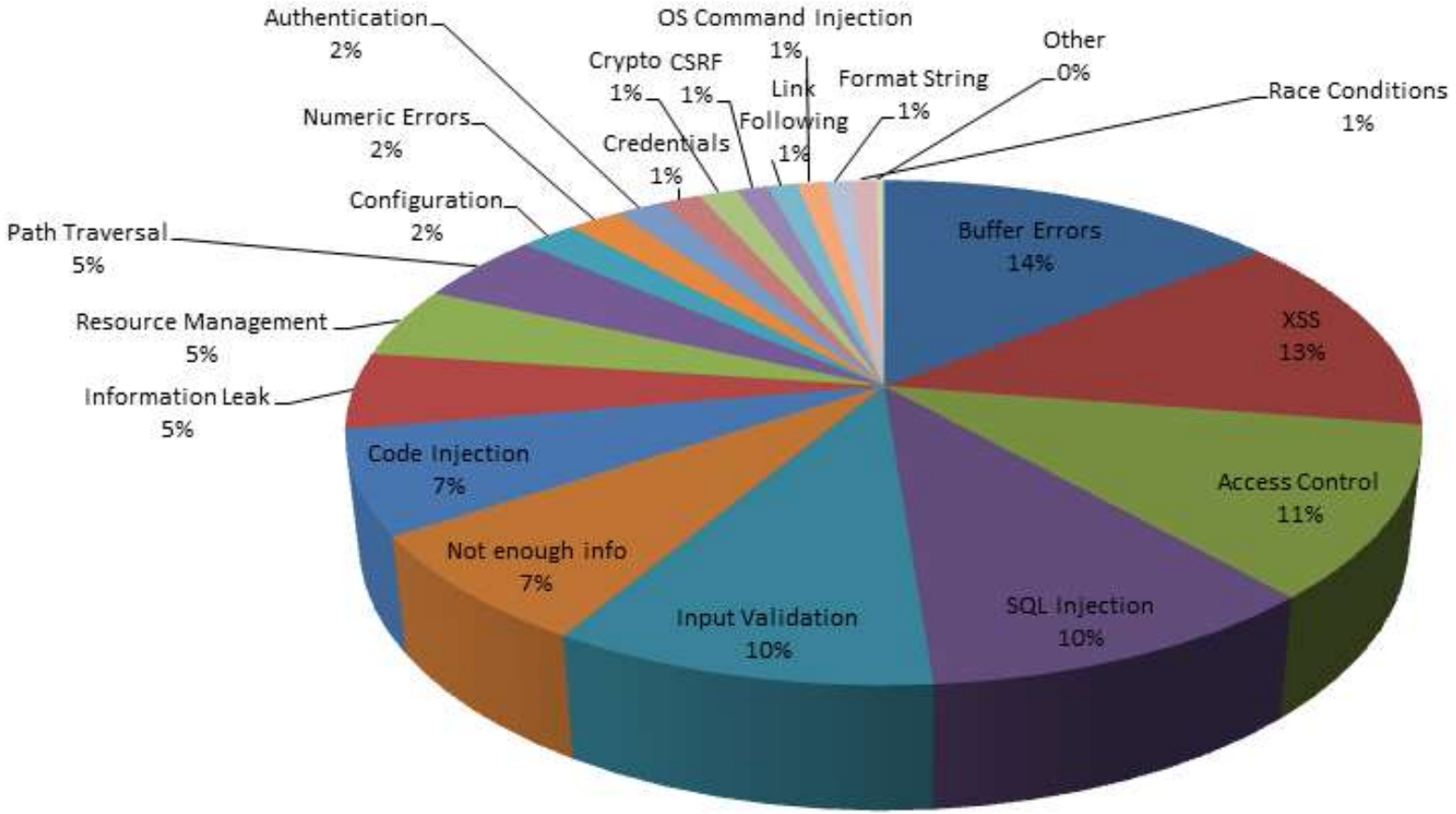
# Vulnerabilities by Type

- NVD CWE subset continued:
  - Cryptographic issues: errors in crypto
  - Path traversal: incorrectly handling input like “..”
  - Code injection: executing scripting code or similar
  - Format string vulnerability: when attackers control the format specifier for a formatting function
  - Configuration: errors in configuration
  - Information leak: exposing sensitive information
  - Input validation: lack of verifying input, overlaps with other categories, kind of a misc. category
  - Numeric errors: integer overflows, signedness errors, etc.

# Vulnerabilities by Type

- NVD CWE subset continued:
  - OS Command Injections: executing via command line
  - Race conditions: time of check to time of use errors
  - Resource management errors: memory leaks, consuming of excess resources, etc.
  - SQL injection
  - Link following: following symlinks / hard links

# Vulnerabilities by Type



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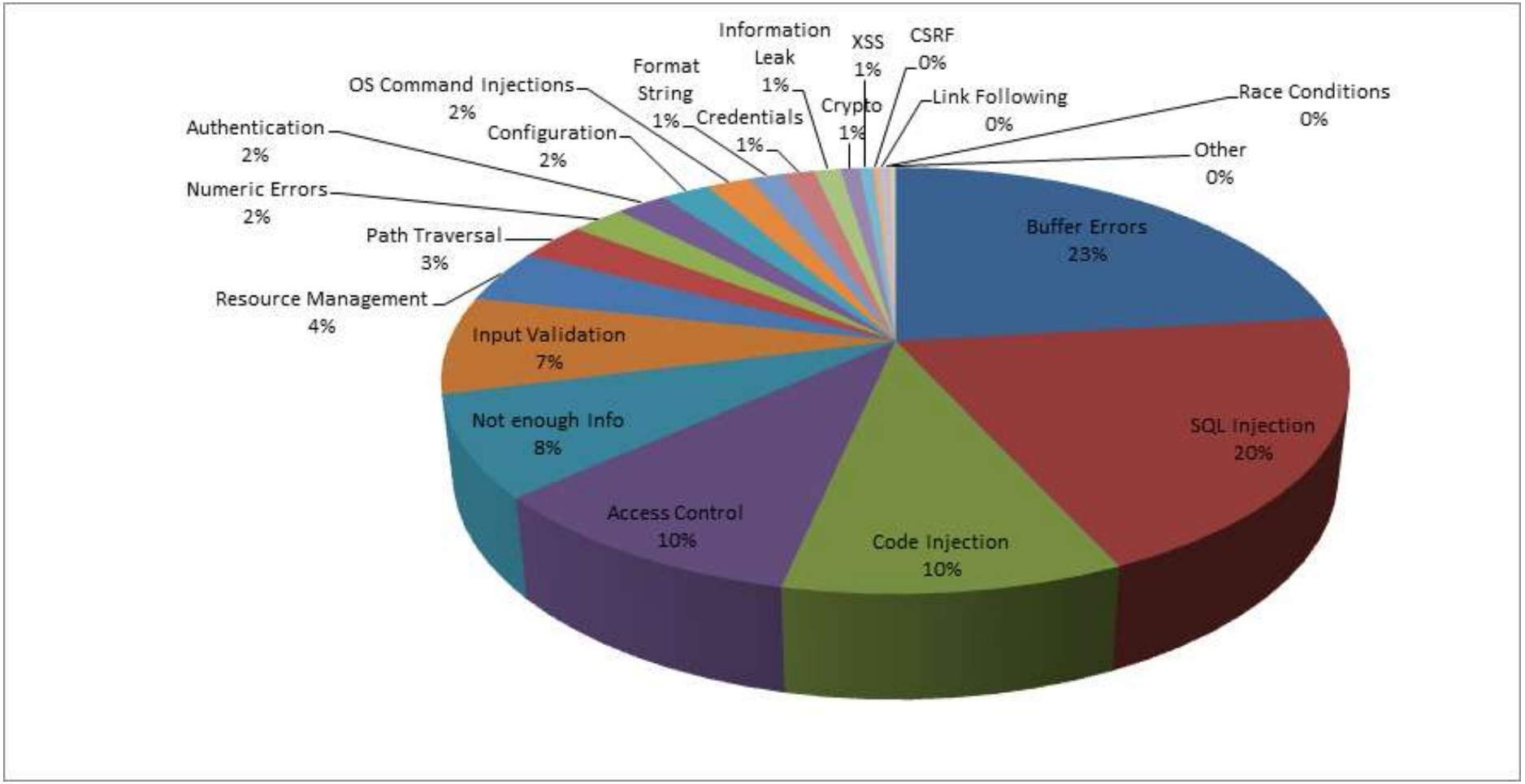
# Serious Vulnerabilities by Type



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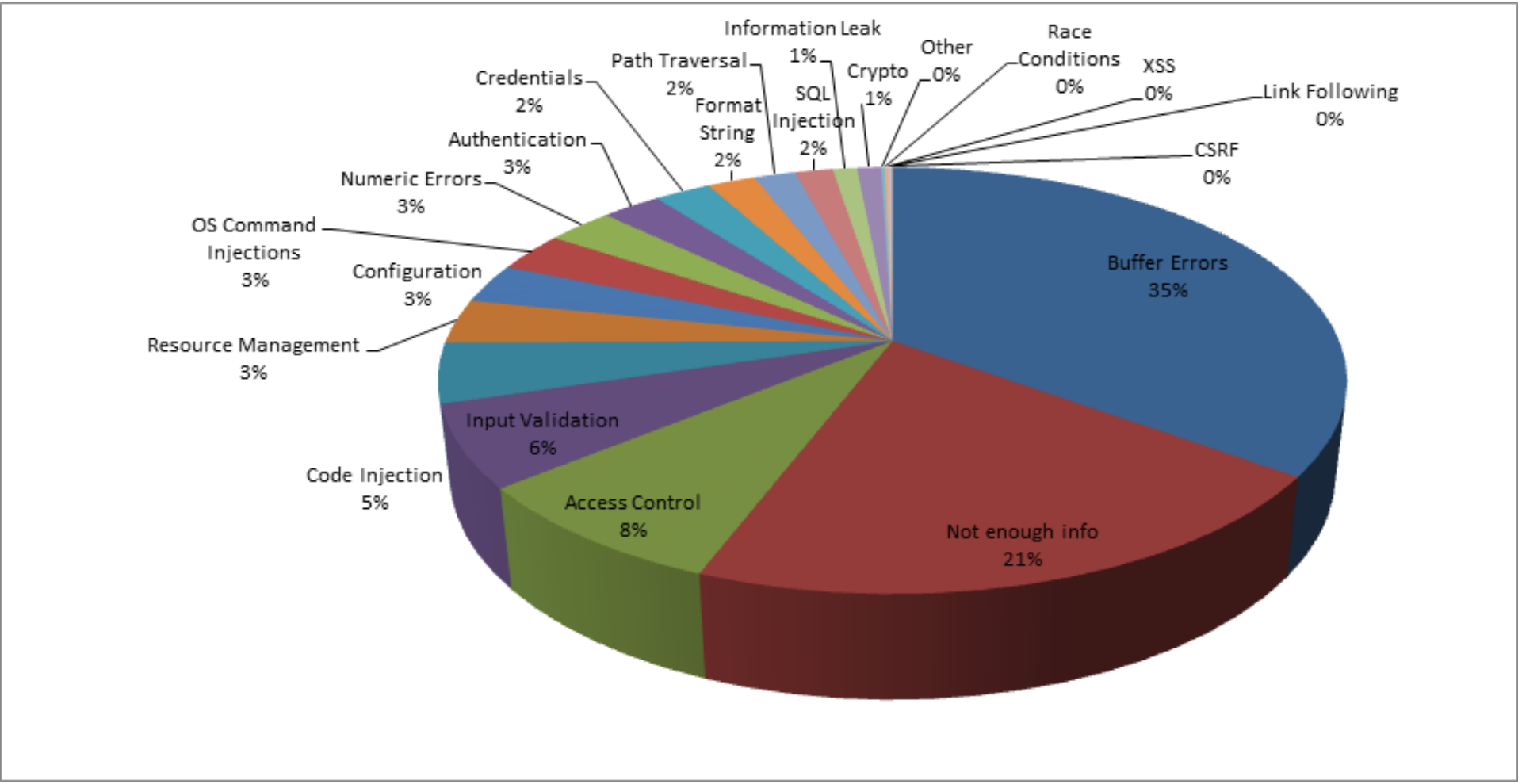
# Critical Vulnerabilities by Type



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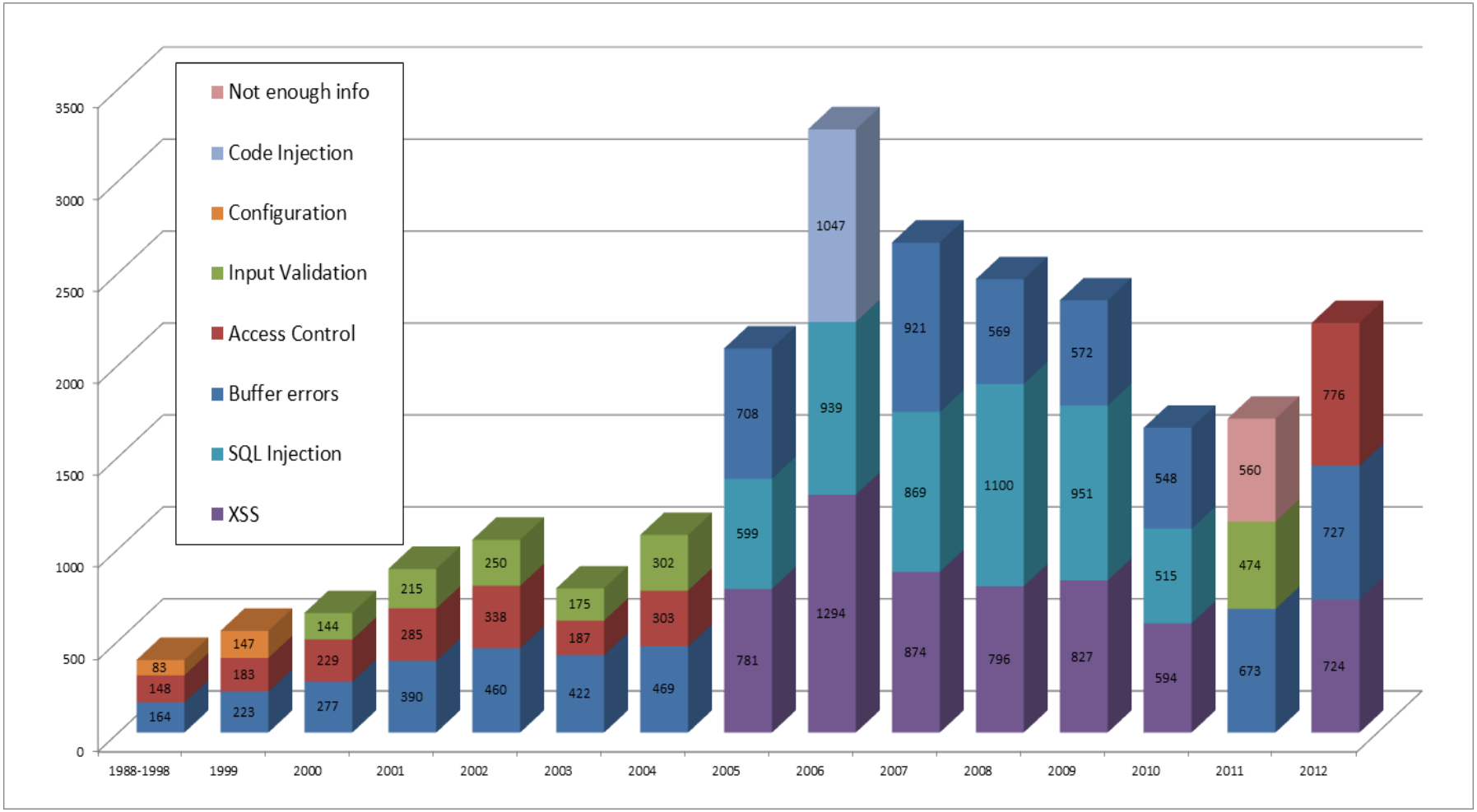
# Vulnerability Types Over the Years



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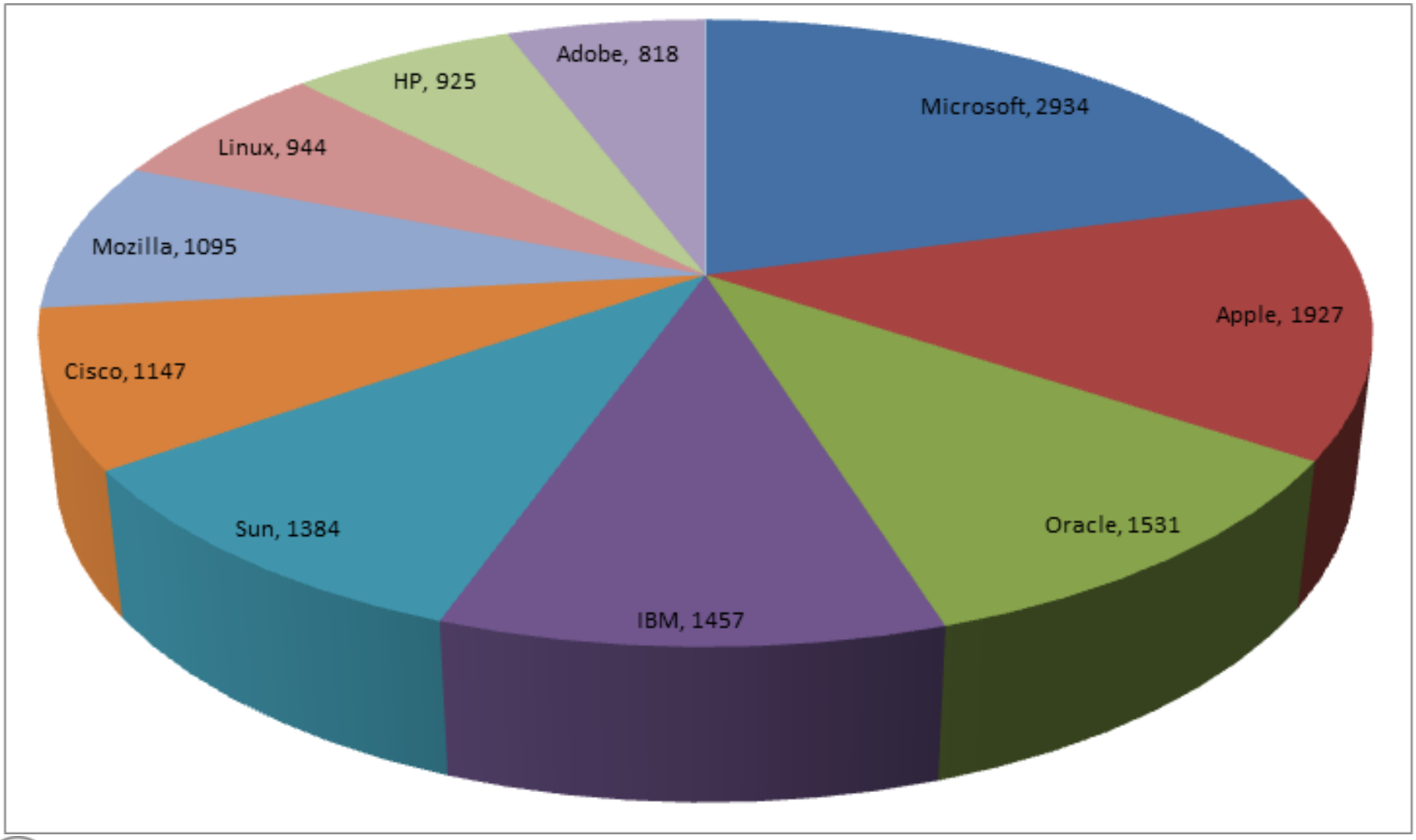
# Vulnerabilities by Vendor

- NVD has information on affected product for 53,211 vulnerabilities
- Top 10 vendors account for 14,162 vulnerabilities, almost 27% of all vulnerabilities.
- Some vendors have lots of products, which can result in a higher total vulnerabilities count
- We will also look at specific products later so we can provide more extensive analysis

# Top 10 Vendors for Total Vulns



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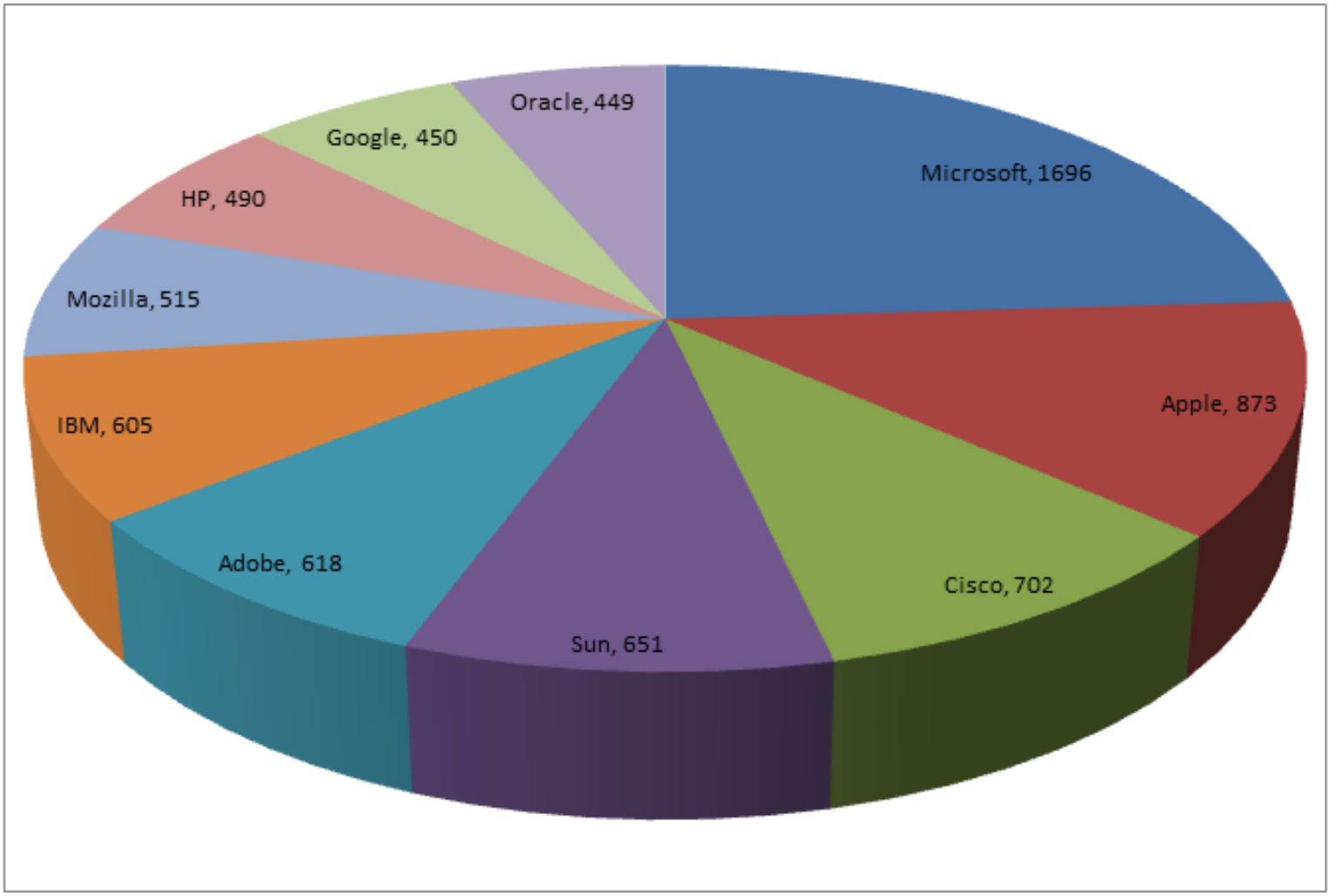
# Top 10 Vendors for Serious Vulns



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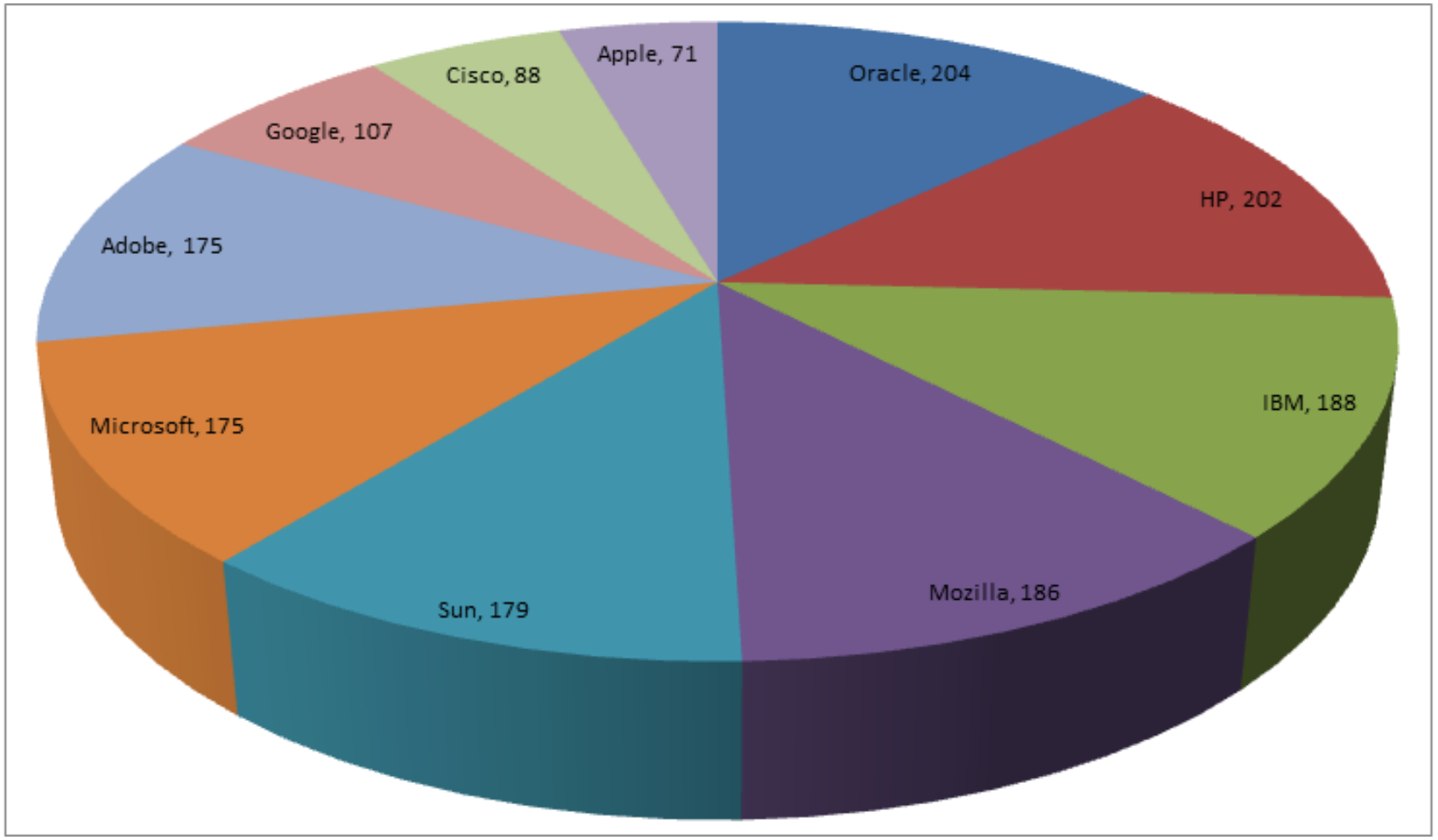
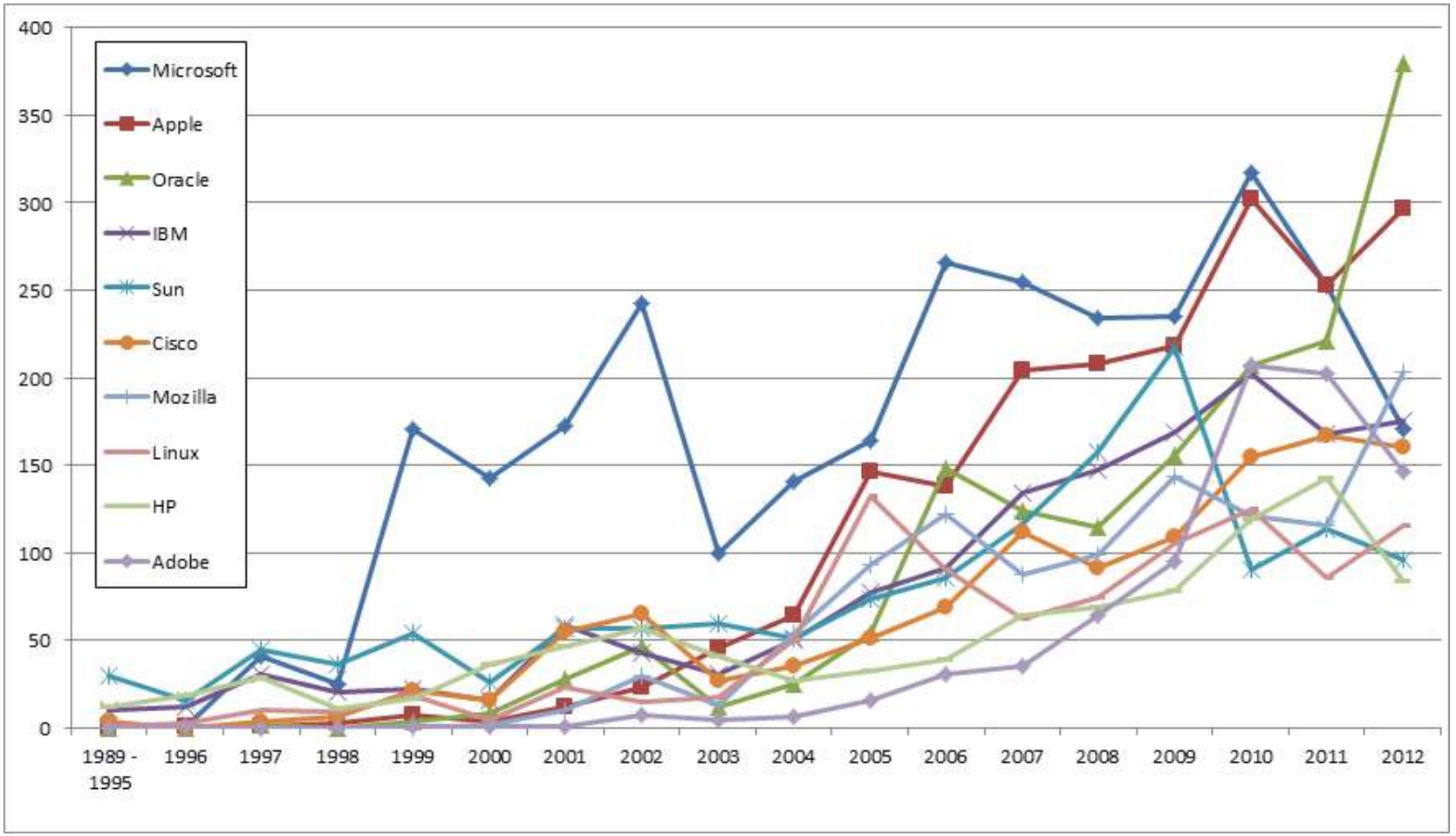
# Top 10 Vendors for Critical Vulns



# Top 10 Vendors over the Years



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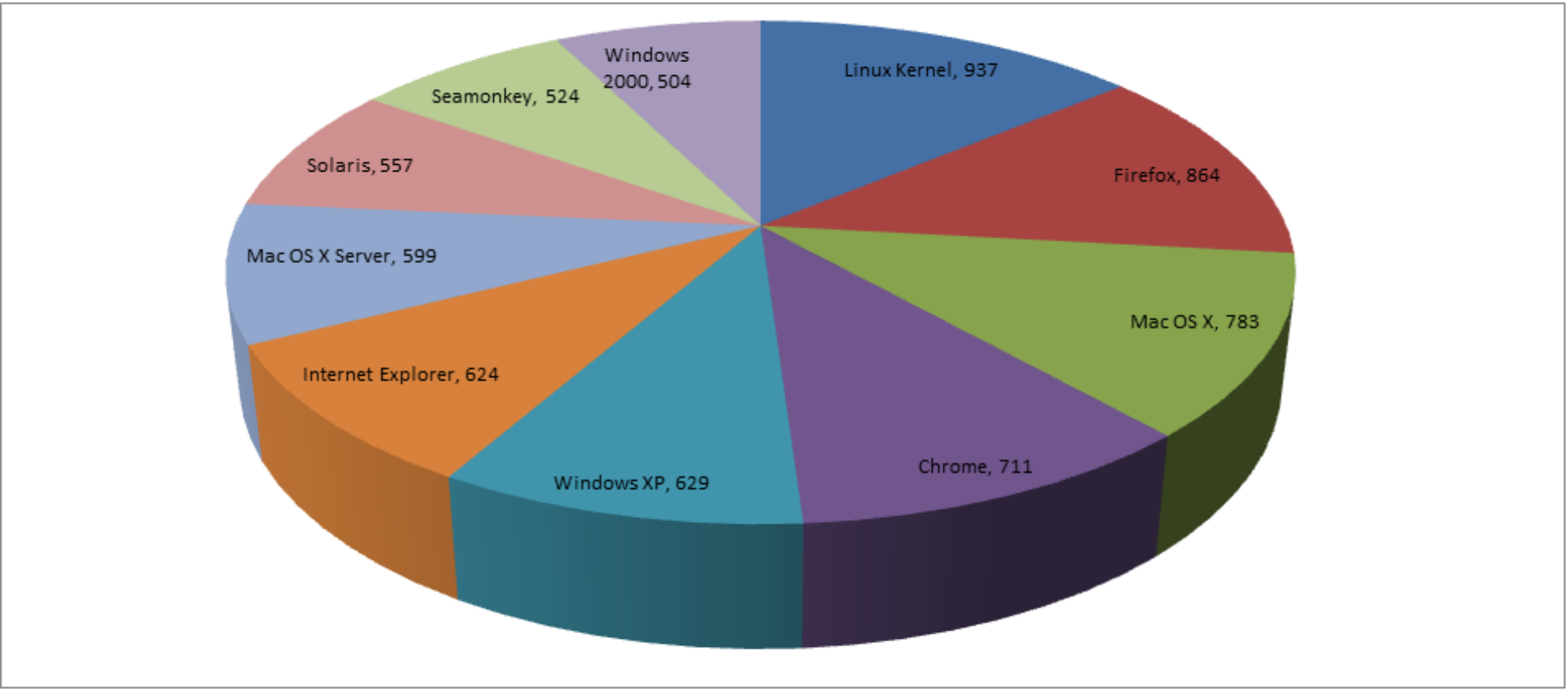
# Vulnerabilities by Product

- Our vendor comparison gave us an idea who had to deal with the most vulnerabilities
- However, vendors have multiple products: having more products, will usually result in suffering from more vulnerabilities
- Here we look at product specific comparisons

# Top 10 Vulnerable Products



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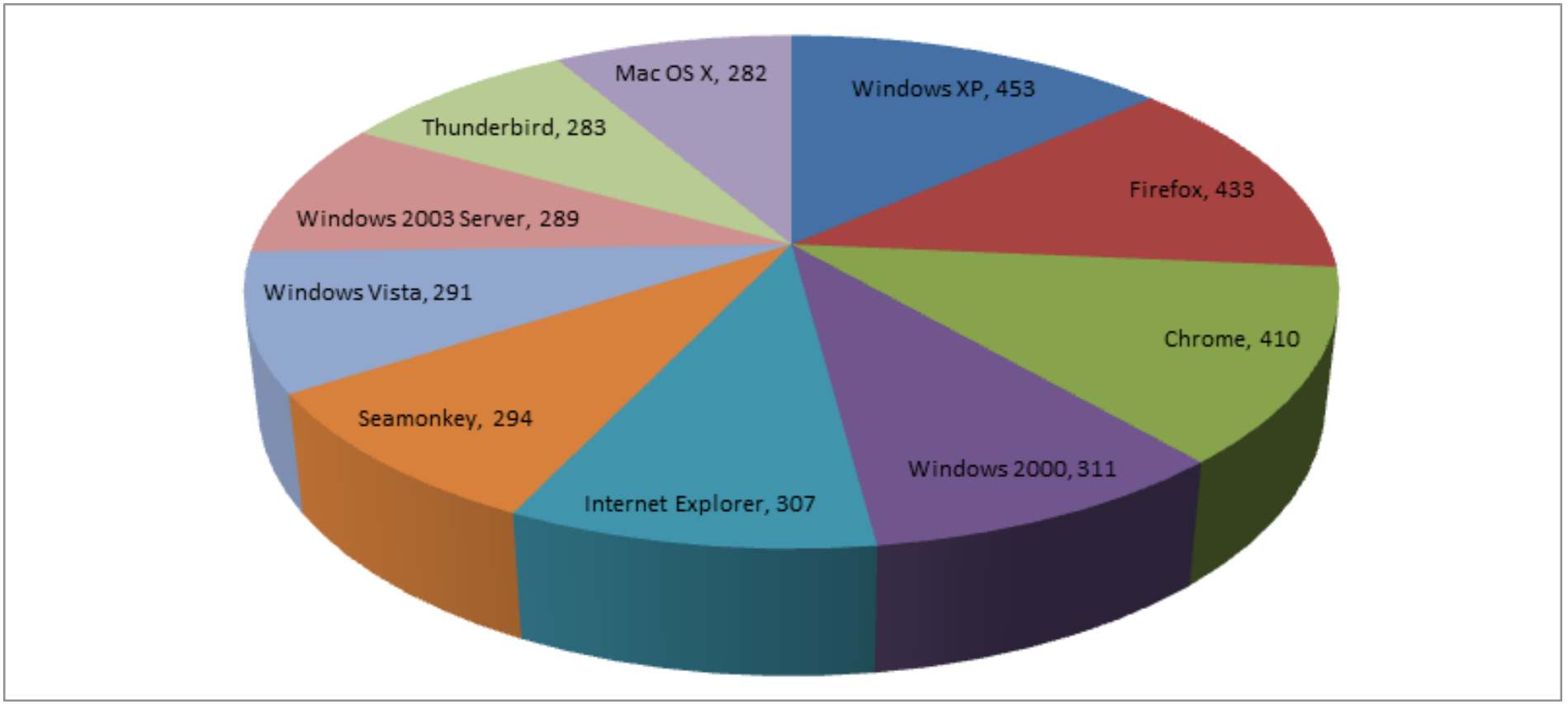
# Top 10 Seriously Vulnerable Products



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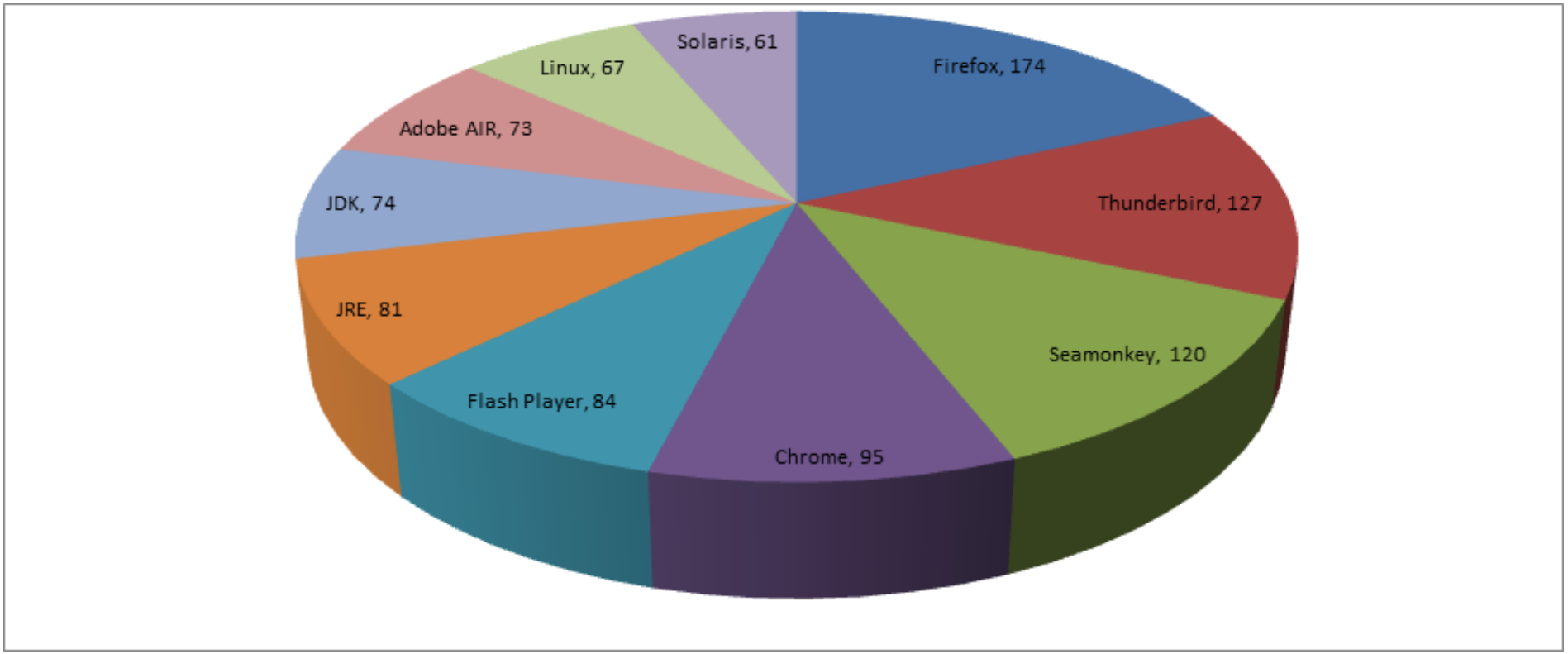
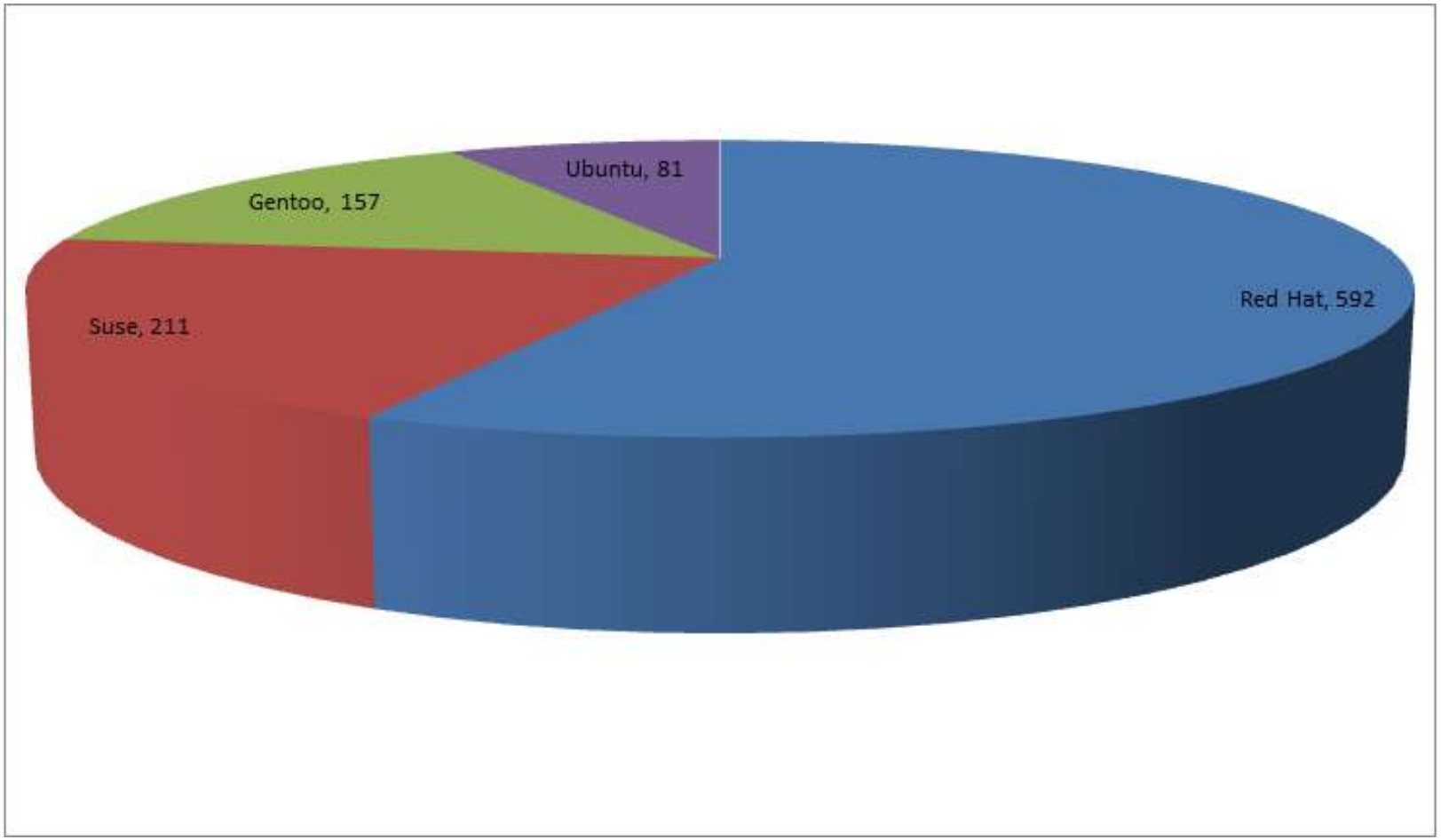
# Top 10 Critically Vulnerable Products



# Vulnerabilities by Linux Distribution



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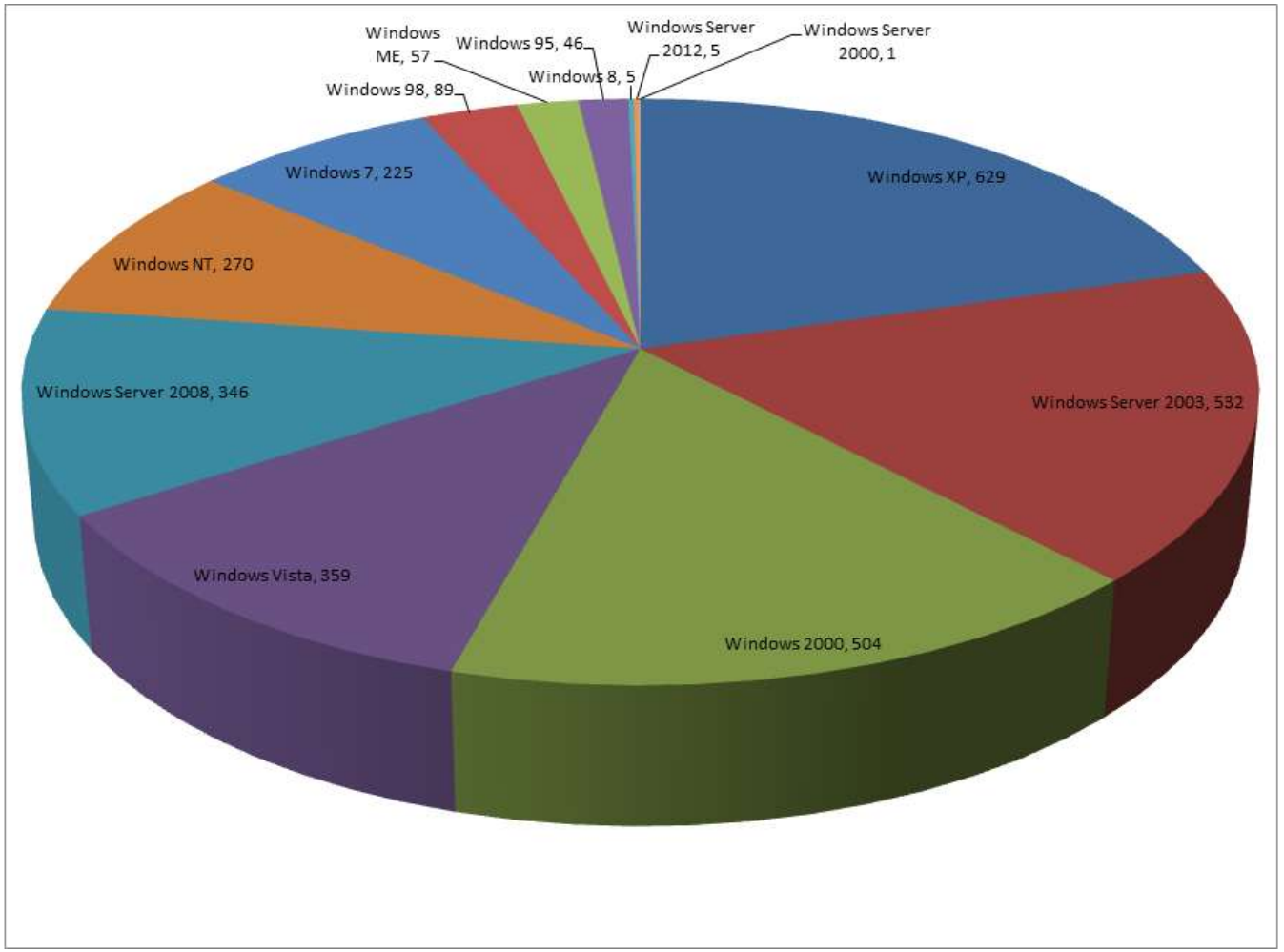
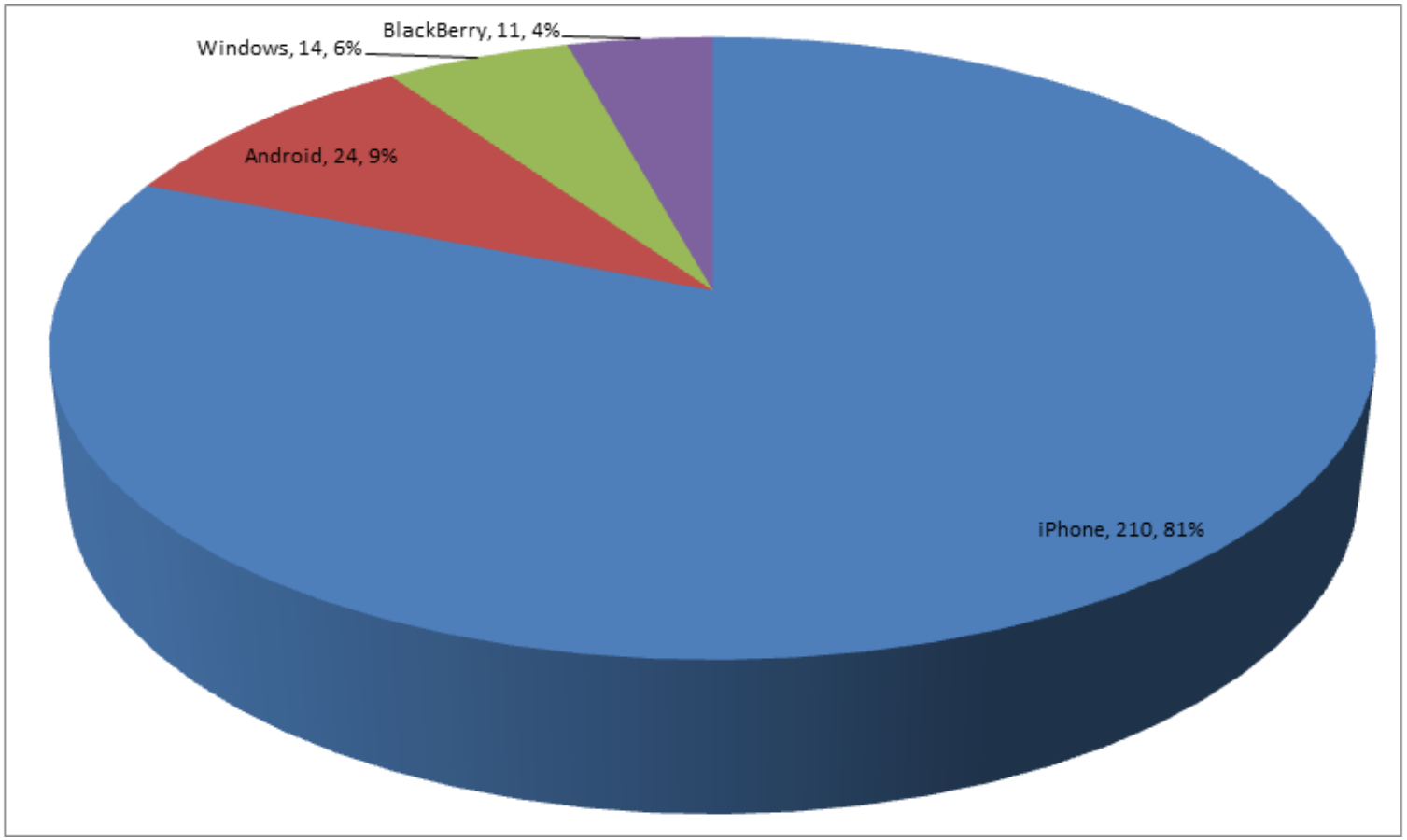
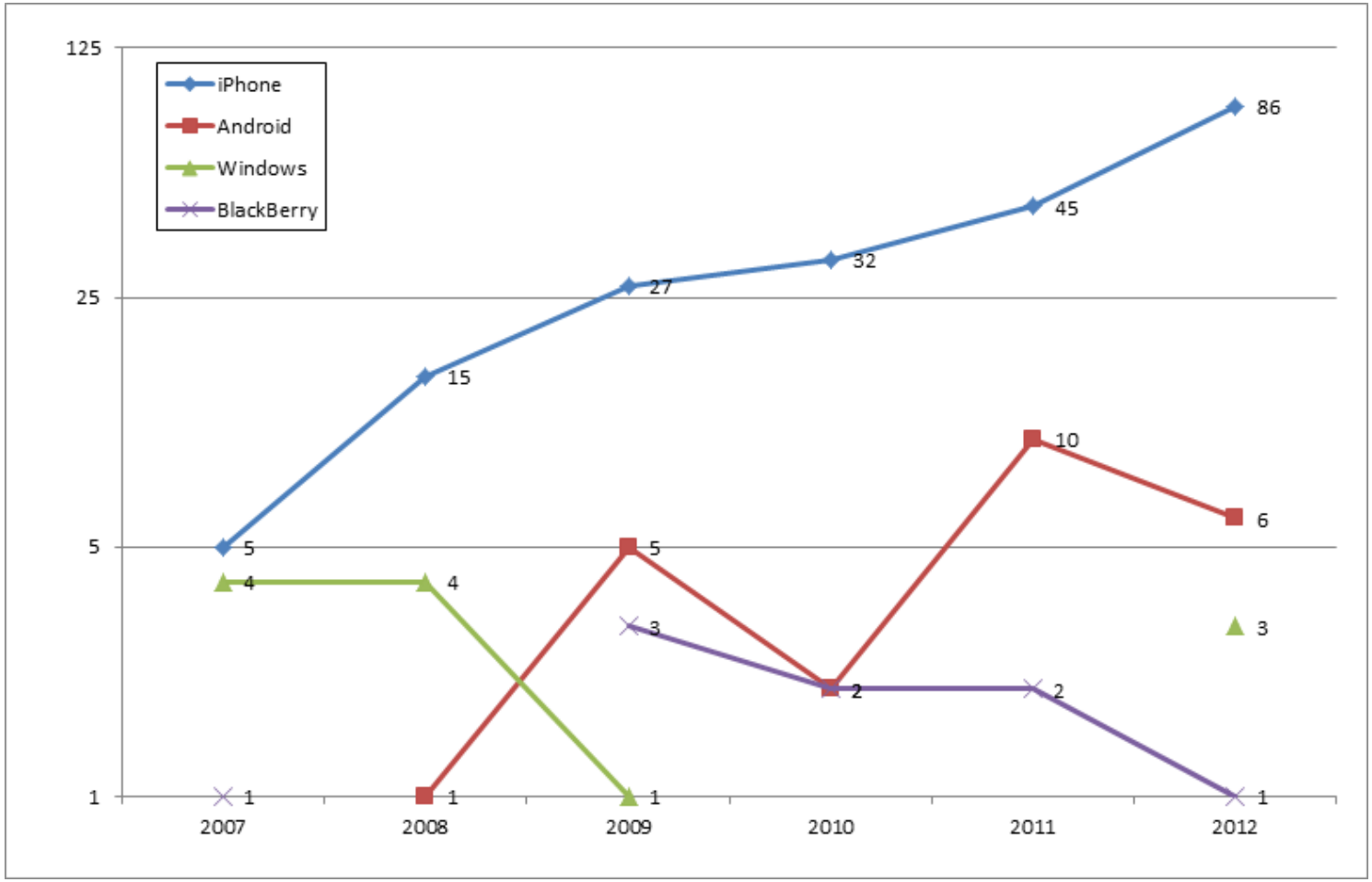
# Vulnerabilities by Windows Version



# Vulnerabilities by Mobile Phone OS



# Trends in Mobile Phone Vulnerabilities



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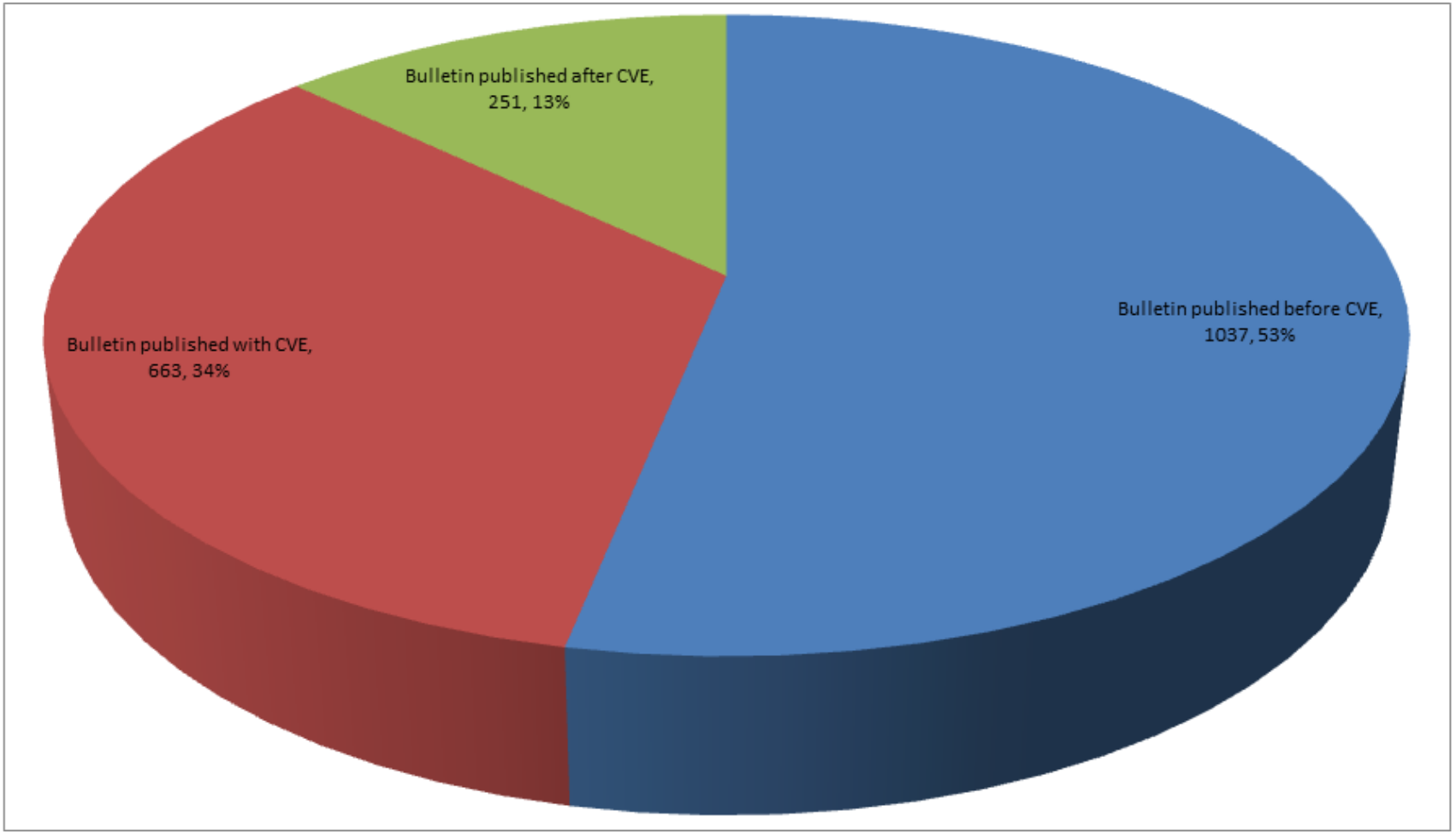
# Microsoft Bulletins

- Contain information on all Microsoft vulnerabilities and associated CVEs
- Correlate the release dates of the bulletins with the release dates of the CVEs
- Gives us insight into how often vulnerabilities are 0 day vulns
  - If CVE is published before MS bulletin meaning that vulnerability information was available before a response from MS

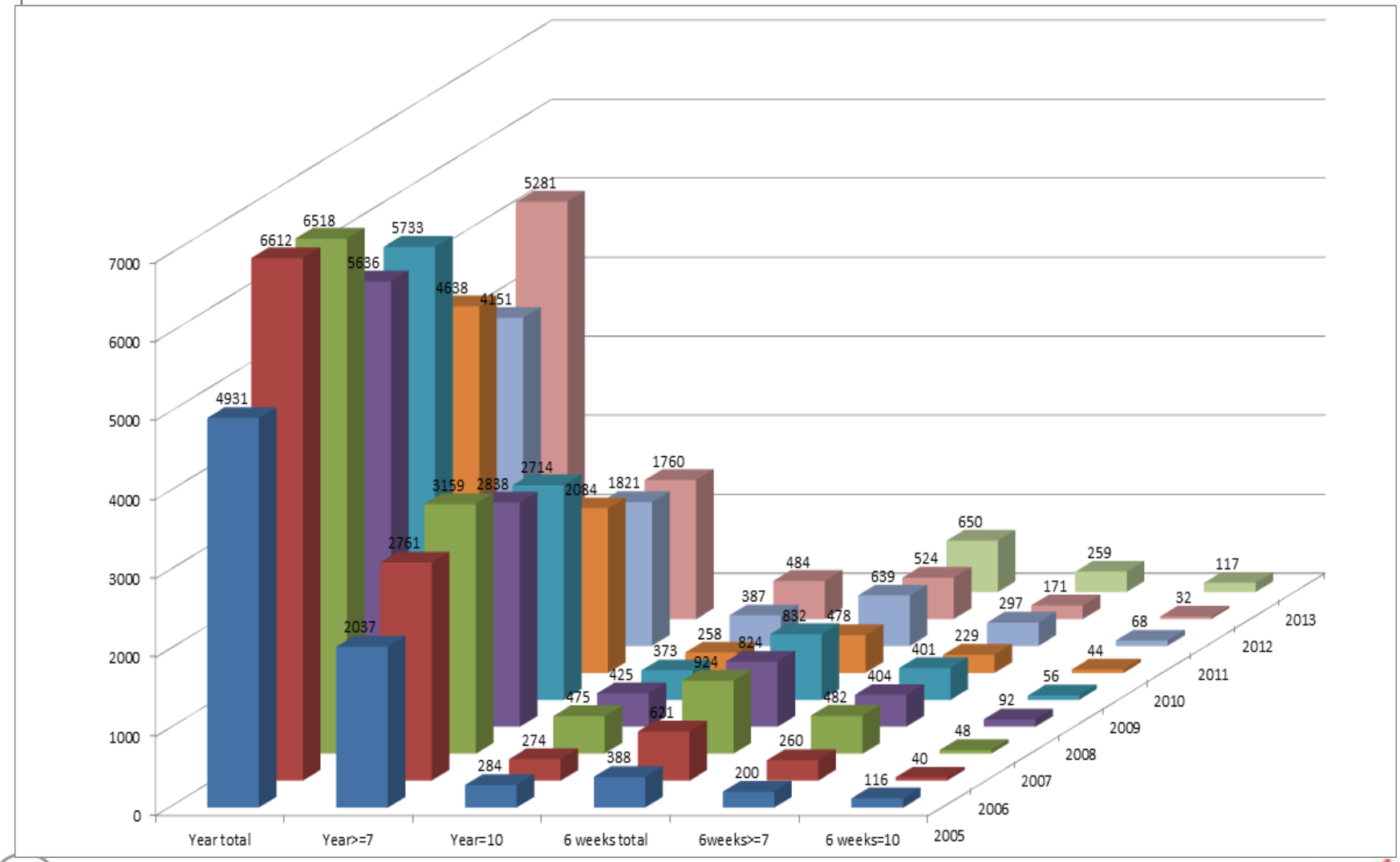
# CVE Correlated with MS Bulletins



# Present

- Let's take a look at the first 6 weeks of 2013: January 1st until February 14th
- We will look at total vulnerabilities this year and severity
- We will also look at the top 10 vendor and top 10 products for these first 6 weeks

# Total Vulns: 2013



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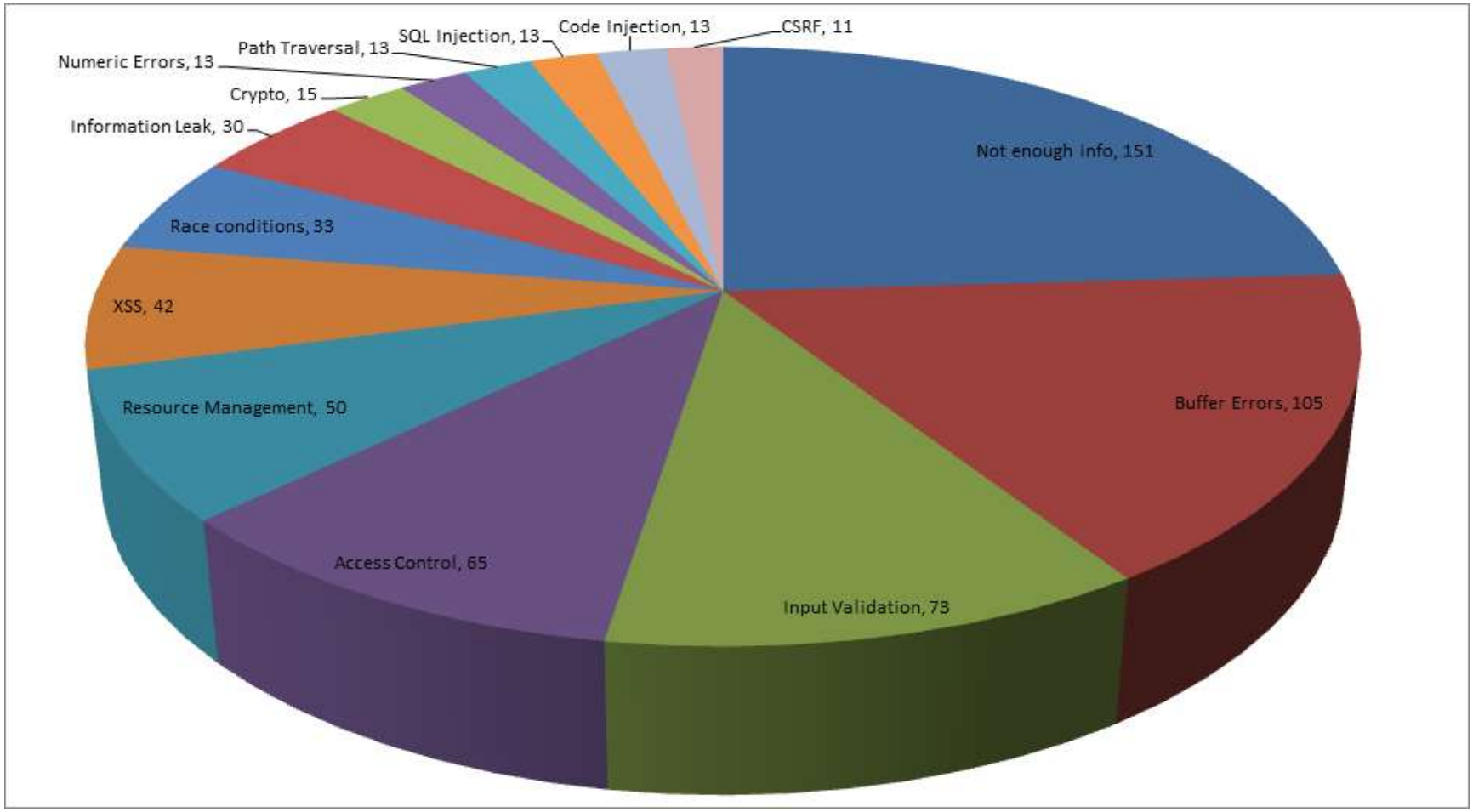
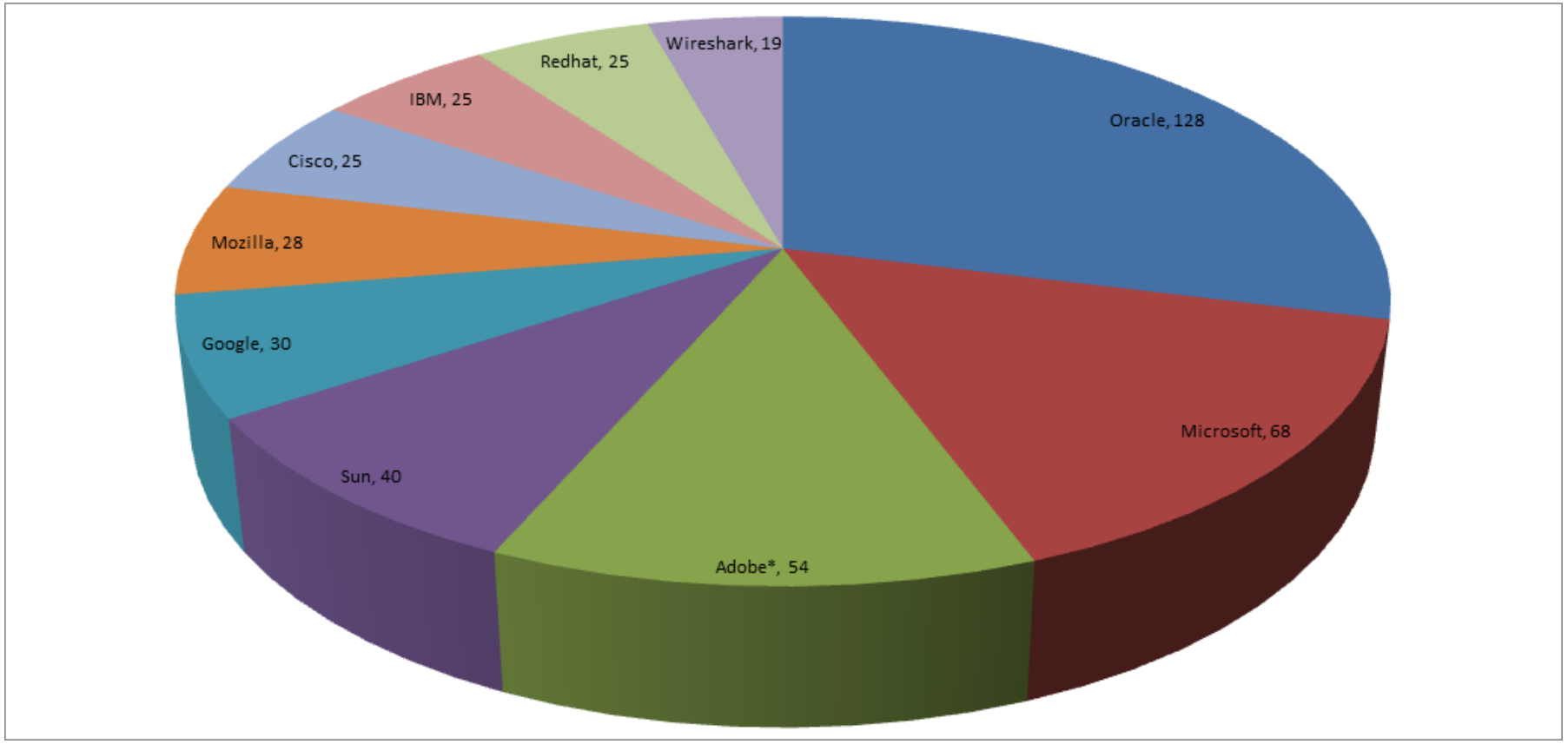
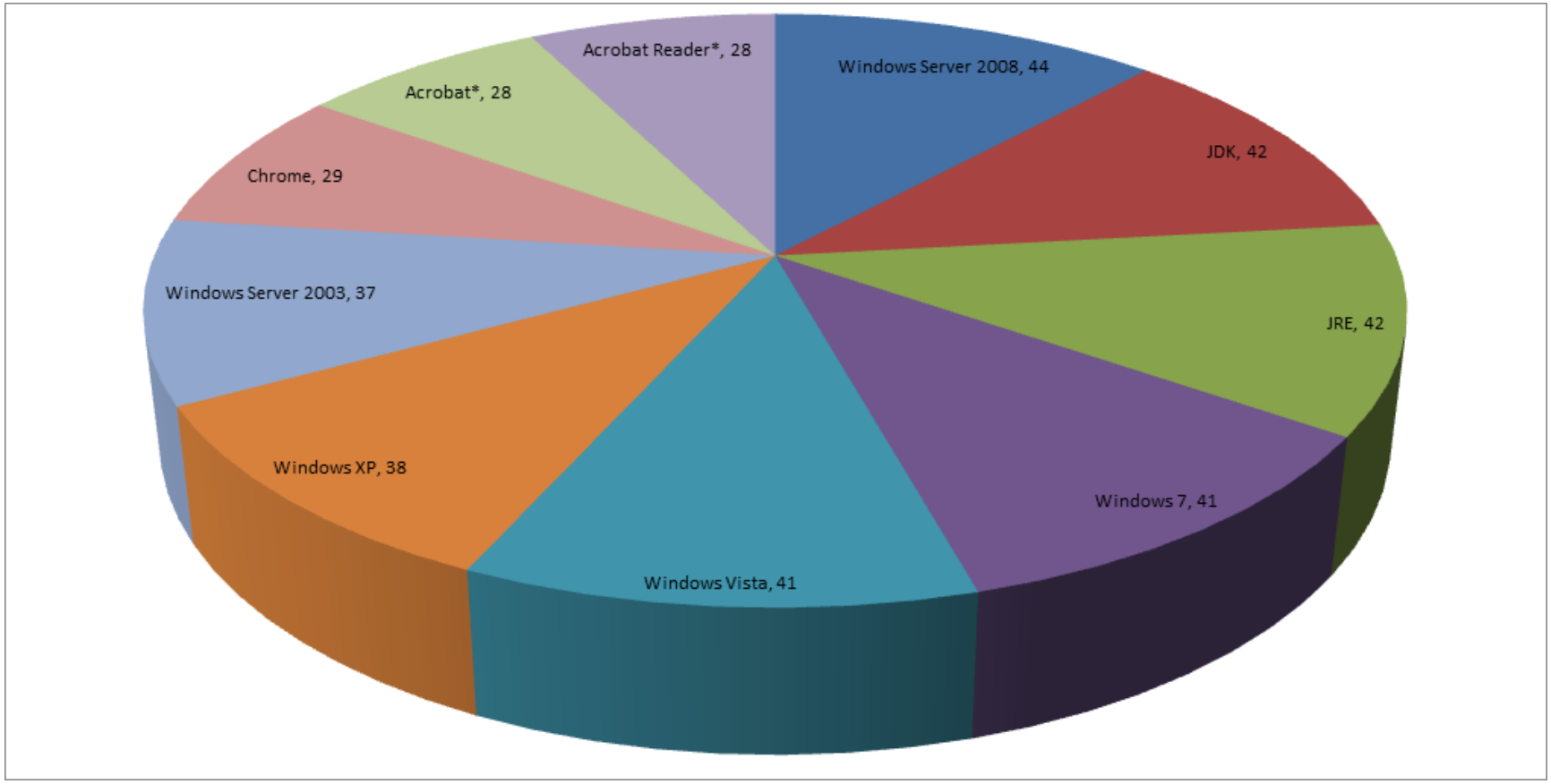
# Vulnerability Types: 2013



# Top 10 Vendors: 2013



# Top 10 Products: 2013



# Future

- Plenty of static analysis tools, mitigations, etc. yet buffer overflows remain a very important vulnerability now and will probably will in the future too
- Access control / privilege issues will continue to remain important in large part due to better privilege separation
- Oracle will probably remain at the top for a while
- Google will probably enter the top 10 this year and will remain there

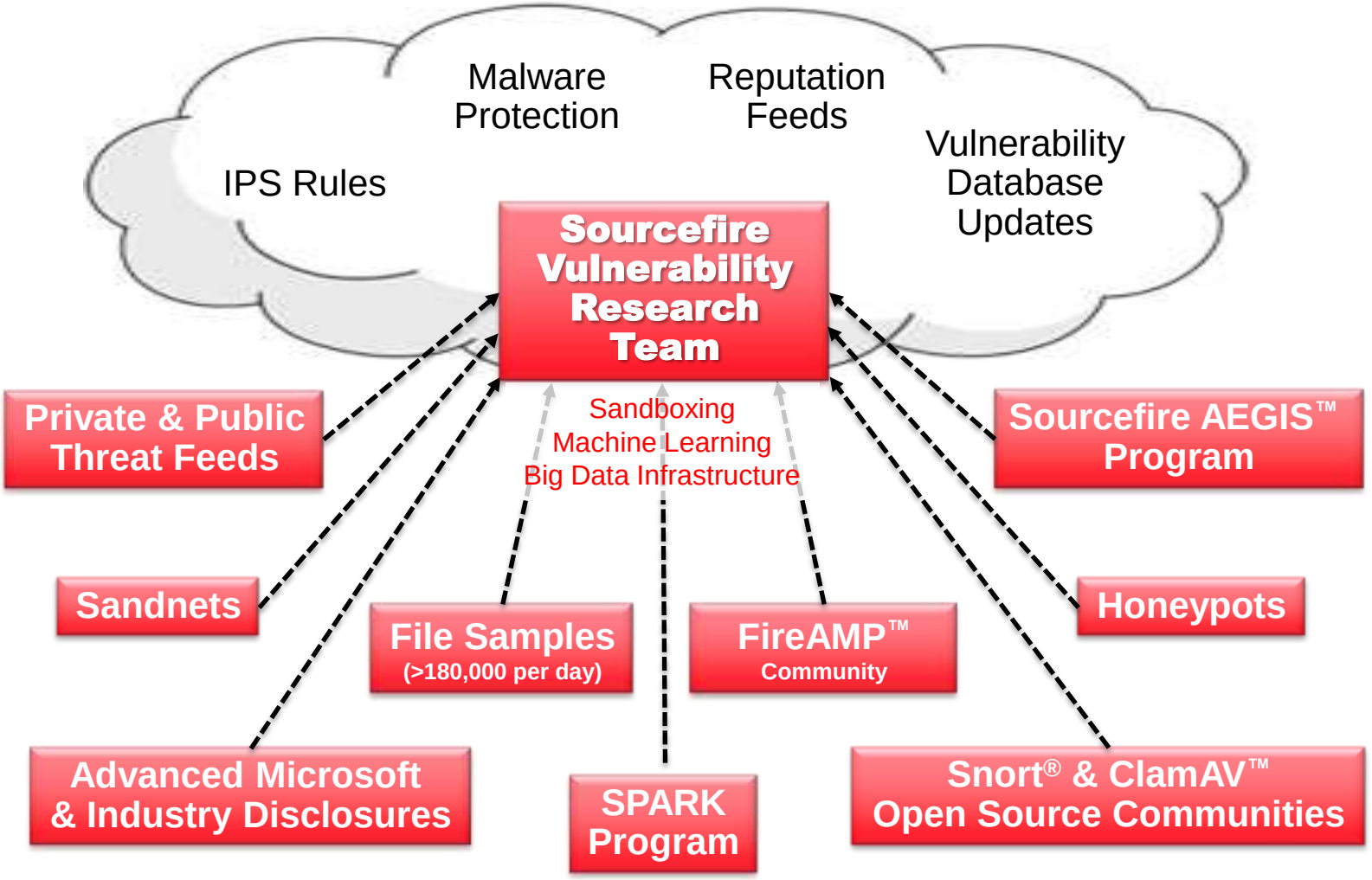
# Conclusion

- Fewer vulnerabilities were reported in 2012, but the percentage of critical vulnerabilities has increased in the last 2 years
  - The trend of more critical vulnerabilities seems to be continuing into 2013
- Microsoft has significantly improved in the last couple of years, their browser and mobile OS are better than their competitors in terms of vulnerabilities discovered

# Conclusion

- Apple and Google have different track records for their browsers vs. mobile operating systems
  - Chrome is ranked one of the highest for vulnerabilities
  - Android has very few
  - Safari has the fewest vulnerabilities compared to other browsers
  - iPhone has a significant lead in vulnerabilities
- Full report available via http://www.sourcefire.com/25yearsofvulns

# Collective Security Intelligence



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- Open source projects
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# Questions

Contact: yyounan@sourcefire.com

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