系統級沙箱弱點及逃逸技巧

System-level Sandbox Vulnerability & Escape Techniques

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自我介绍About Me

- ID: MJ0011
- 內核驅動工程師 Kernel Driver Engineer
- 專長：内核漏洞、安全對抗、Rootkit、逆向工程
- Profession: Kernal Vulnerability, Security & Defense, Root Kit, Reverse Engineering
- 演講：
- XCON2008(Bootkit)
- POC2009(外部即時分析Vmware）
- POC2010(Anti Virus軟體内核漏洞）
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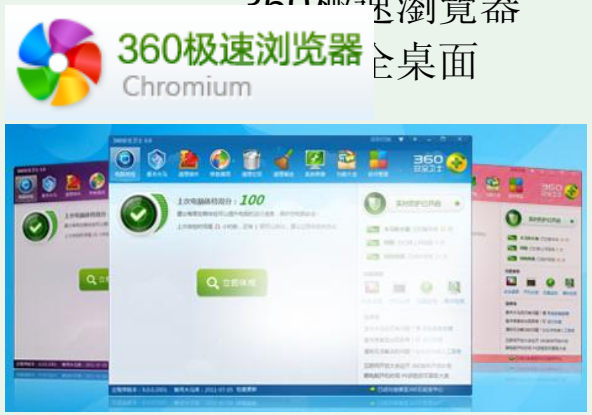
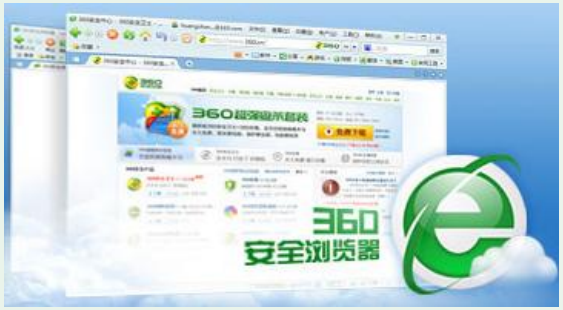
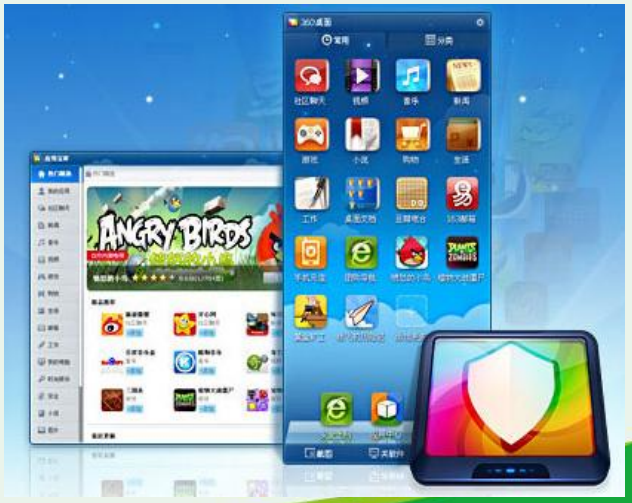
360介绍About 360

奇虎360科技有限公司 Qihoo 360 Technology

- 2005/9月成立於中國北京 Sept. 05' Establishment in Beijing, China
- 2011/3/30 美國紐約交易所上市, NYSE: QIHU March 11' listed in NYSE:QIHU
- 2011/3月底止, 3.45億用戶, 覆蓋88%中國上網用戶 345 million users until end of March 11', coverage of 88% Chinese internet surfers
- 主力安全產品 Main Security Solutions
  - 360安全衛士 – 全方面安全防護軟體
  - 360殺毒 – 輕量擁有四引擎防護, 包括 BitDefender / Avira 国际知名引擎
  - 360安全瀏覽器
  - 360極速瀏覽器
  - 360桌面







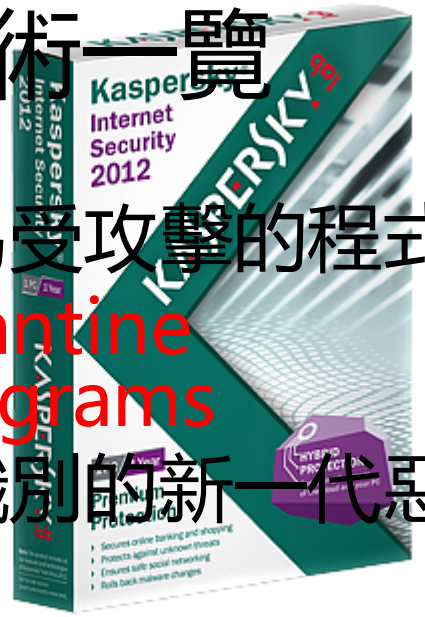
議程 Agenda

- 系統級沙箱防禦技術一覽 Summary of System-level Sandbox Defense
- Avast! AV6 AutoSandbox 弱點分析及逃逸 Vulnerability Analysis & Escape
- Kaspersky KIS2012 SafeRun 弱點分析及逃逸
- Comodo CIS2011 AutoSandbox 弱點分析及逃逸
- Kingsoft KAV2012 AutoSandbox 內核安全性漏洞

系統級沙箱防禦技術一覽

- 系統級沙箱：隔離可疑程式或易受攻擊的程式
- System-level Sandbox: Quarantine Suspicious or Vulnerable Programs
- 集成到殺毒軟體中，結合可疑識別的新一代惡意程式防禦技術

Collect into antivirus software, combine with a new generation of malware defense technique that identifies suspicious programs



Kaspersky Internet Security 2012

Premium Protection

Kaspersky Internet Security 2012 delivers premium protection from viruses, Trojans, spam, hackers, and more. Its cutting-edge, hybrid approach to digital security [illegible] You, your private data and PC are completely protected as you work, bank, shop and play online.

Renew and

1 PC

$59.95

1 Year

Auto-renewal

Buy Now

Protection Level

Key Features

Boot-tim
Scans

avast!
Opens a
once it's cl

AutoSan
Prompts u

avast! Sa
Provides a
PC).

- **Kaspersky URL Advisor**
  Improved!
- **Kaspersky File Advisor**
  Checks file safety with a single click of the mouse New!
- **System Watcher**
  Monitors suspicious application activities and allows you to roll back system changes made by malware Improved!
- **Application Control**
  Restricts program access to personal data and system files according to the level of danger that each program presents Improved!
- **Safe Run Mode**
  Lets you launch suspicious applications and websites in a special, isolated environment where they cannot harm your computer
- **Two-way personal firewall**
  Protects against hacker attacks
- **Anti-Phishing and Anti-Spam technology**
  Provides reliable protection for your personal information and guards against unwanted spam and adware Improved!
- **Parental Control**
  Provides flexible and effective settings to keep children extra-safe when they use computers and the Internet Improved!
- **Completely redesigned interface**

s no traces

of your real

系統級沙箱防禦技術一覽

- 必備防禦及實現方式
- I/O隔離：FsFilter/RegCallback/Api Hook
- 程式行爲隔離： Restricted Token/Api Hook
- RPC隔離： Restricted Token/Api Hook
- UI隔離： Job/Api Hook

系統級沙箱防禦技術一覽

- 沙箱面臨的安全挑戰 Challenges that sandbox faces

- 隔離必須面面俱到，任何一點的隔離被突破，都將導致整個沙箱失效、惡意程式從沙箱逃逸
- Quarantine must be well-rounded
- 沙箱中惡意程式逃逸後的安全問題：比普通惡意程式更嚴重，虛擬化可能使其他防禦機制失效
- Security issues raised after malware escapes
- 沙箱驅動Hook實現不當可導致內核安全性漏洞 Inappropriate implement of sandbox driver hook may cause kernel vulnerability

Avast! 沙箱弱點和逃逸

- Avast! AutoSandbox 弱點
- 弱點1：RPC隔離可被繞過
- Avast!通過Ring3 Api Hook攔截部分RPC行為操作:SCM、Remote Registry …
- 突破：恢復Ring3 Api Hook，穿透Avast! 沙箱註冊表虛擬化，寫入系統關鍵註冊表位置
- Demo

Avast! 沙箱弱點和逃逸

- 弱點2：進程行為防護可被繞過
- Avast! Hook SSDT NtOpenProcess防止沙箱內部進程訪問外部進程
- Hook處理方式漏洞：先調用原始函數，成功打開後再使用NtDuplicateObject將獲得的Handle降權後，關閉原始Handle，返回降權Handle，Duplicate失敗則不關閉
- 突破：Handle洪水攻擊，填滿當前進程Handle Table，使NtDuplicateObject失敗，獲得沙箱外部進程高許可權Handle，注入外部進程
- Demo

Kaspersky沙箱弱點和逃逸

- Kaspersky SafeRun 弱點：
- UI隔離功能缺失
- 突破：keybd_event模擬鍵盤消息在沙箱外運行任意程式
- Demo

Comodo沙箱弱點和逃逸

- Comodo AutoSandbox實現：
- 沙箱安全性分級，其中“不可信任級別”防護非常嚴格，超過其他三家沙箱，擁有行為防禦+受限用戶+JOB UI隔離
- 弱點：UI隔離幾乎完全依賴JOB
- 突破：利用系統機制，繞過註冊表虛擬化載入輸入法，對外廣播消息，注入外部進程
- Demo

Comodo沙箱弱點和逃逸

- 詳解突破依賴作業系統實現的沙箱的方式：繞過註冊表虛擬化添加輸入法的原理
- 系統KeyboardLayout鏈載入方式
- ImmLoadLayout的機制導致註冊表虛擬化無效，成功在註冊表虛擬化下添加全域輸入法
- 消息廣播使全域輸入法生效，注入外部進程

Kingsoft沙箱内核安全性漏洞

- SSDT Hook的安全性問題：參數檢查的疏漏
- 十年前就被提及，BSODHook
- 在過去防禦軟體的SSDT Hook中，參數檢查的疏漏，通常只能引發內核拒絕服務攻擊，影響有限
- 沙箱的SSDT Hook中，由於要改寫訪問資源的最終路徑，參數檢查疏漏將可能導致內核任意位址寫入漏洞，沙箱中任意許可權進程可以直接在內核態運行代碼

Kingsoft沙箱内核安全性漏洞

- Kingsoft KAV2012安全沙箱：幾乎完全沒有參數檢查
- Kiskrnl.sys NtQueryValueKey Hook Local Kernel Mode Privilege Escalation Vulnerability
- 運用沙箱機制觸發NtQueryValueKey hook的漏洞：分別以讀、寫許可權，打開註冊表handle a、b，寫入a，讀取b，讀取時傳遞觸發漏洞的參數
- Demo

Q&A

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- 360Safe HIPS Team

杀木马 打补丁 保护隐私

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