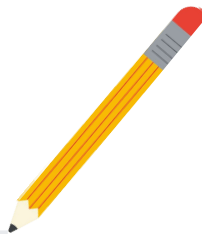
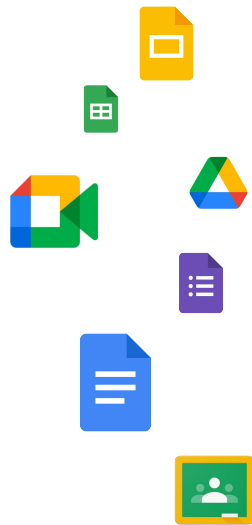




# Chrome OS: Secure by Design

Teach with Chrome Series



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March 22, 2022

# Speaker



**Or Zelig**

Product  
Chrome OS Security



# Google = security



~83% share of malware targets<sup>1</sup>  
85% share of ransomware targets<sup>2</sup>



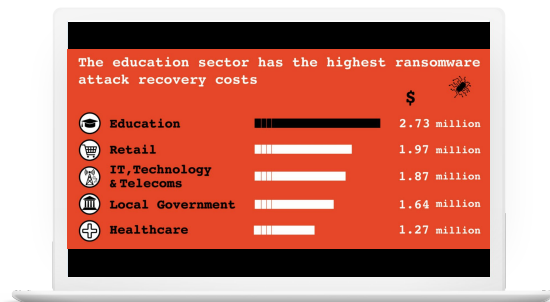
100 vulnerabilities in National Vulnerability Database between May 2011-2021<sup>4</sup>



0 reported ransomware attacks on a Chrome OS device<sup>3</sup>



0 vulnerabilities in National Vulnerability Database between May 2011-2021<sup>4</sup>



## Hackers target students, costing schools hundreds of millions in system downtime

by Mitch Blacher | Monday, December 13th 2021



**JOINT CYBERSECURITY ADVISORY**

**TLP:WHITE**

Product ID: A420-345A  
December 10, 2020

Co-Authoring by:



**Cyber Actors Target K-12 Distance Learning Education to Cause Disruptions and Steal Data**

BROWARD COUNTY

## Hackers Post Files After Broward School District Doesn't Pay Ransom

Hackers publish nearly 26,000 stolen files after seeking \$40 million from district

Published April 20, 2021 • Updated on April 24, 2021 at 9:50 am



## Albuquerque Schools Confirm Ransomware Attack, Resume Class

Albuquerque Public Schools officials have confirmed the nature of a cyber attack that forced the district to cancel classes for two days, affecting 75,000 students.

By Associated Press | Jan. 18, 2022, at 8:59 p.m.

PRIVACY & SECURITY

# Thousands of School Websites Went Down in a Cyberattack. It'll Happen Again, Experts Say



By Alyson Klein — January 10, 2022 ⌚ 4 min read

Dec 5, 2020, 03:18pm EST | 4,701 views

## After Ransomware Attack, School District Says Chromebooks Safe But Not Windows Laptops



Brooke Crothers Contributor  
Consumer Tech  
I cover and review consumer tech

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EDUCATION

## California Schools Proving Easy Targets for Growing Ransomware Attacks



by Zayna Syed July 18, 2021

Share this:



chrome OS

Google for Education



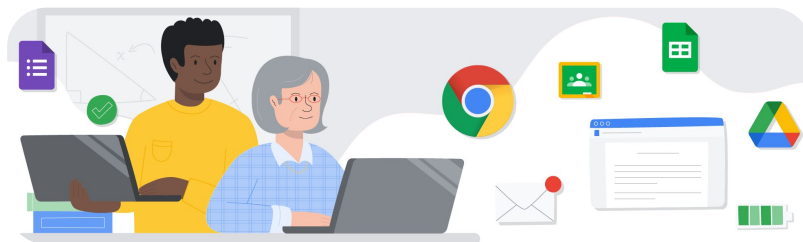
**Baltimore County Public Schools** ✓

@BaltCoPS



**(2/3) You may now safely use: BCPS-issued Chromebooks and BCPS Google accounts for students and staff. Please do not use BCPS-issued Windows-based devices until further notice.**

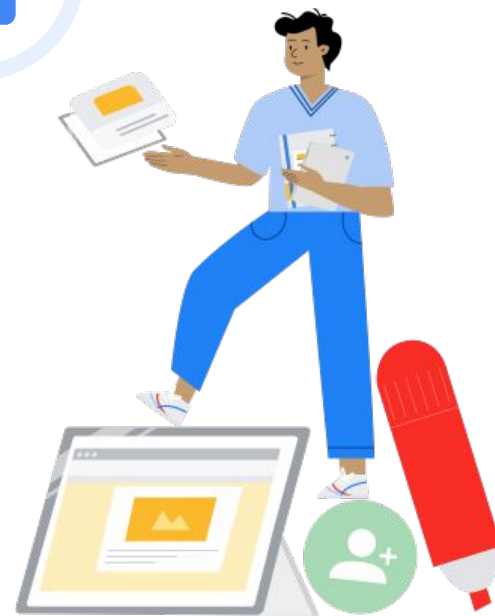
There are still **0 ransomware** attacks reported on Chrome OS.



But you already know Chrome OS is awesome, so I'm going to tell you how we **design and build** every Chromebook to meet our security bar!

# Built-in security

- Hardware
- Firmware
- Drivers
- Operating system
- User sessions
- Policy & management
- App delivery
- Updates
- Power of default



# Hardware

## Hardware security module on every Chrome OS device

A dedicated chip protects the credentials of every user who signs in and the education policies associated with the device

Every Chromebook - regardless of price - is made with our Titan chip designed by Google





# Firmware: Verified Boot

Hardware-backed cryptographic proof to verify boot and enterprise enrollment status

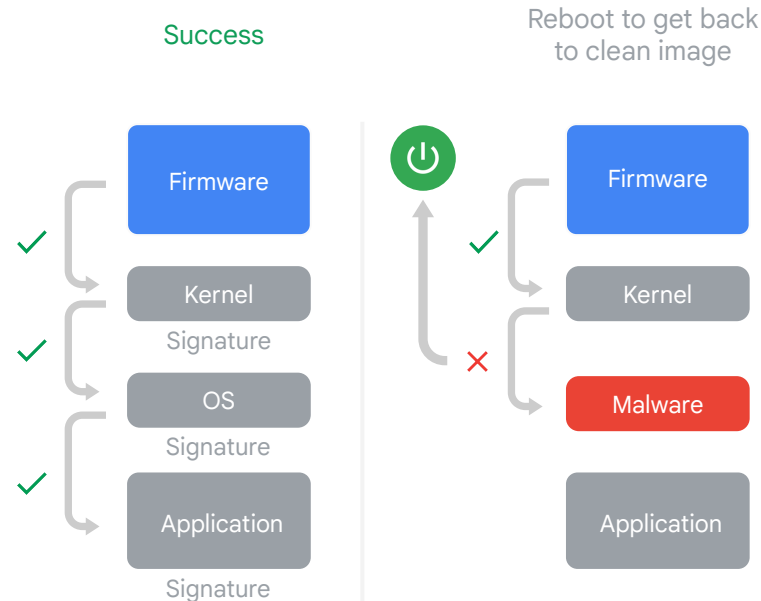
Two instances of Chrome OS run on separate partitions for system verification.

If the system detects malware or malicious software it automatically reverts to the safe image

No BIOS updates from different vendors.

No 3P kernel drivers

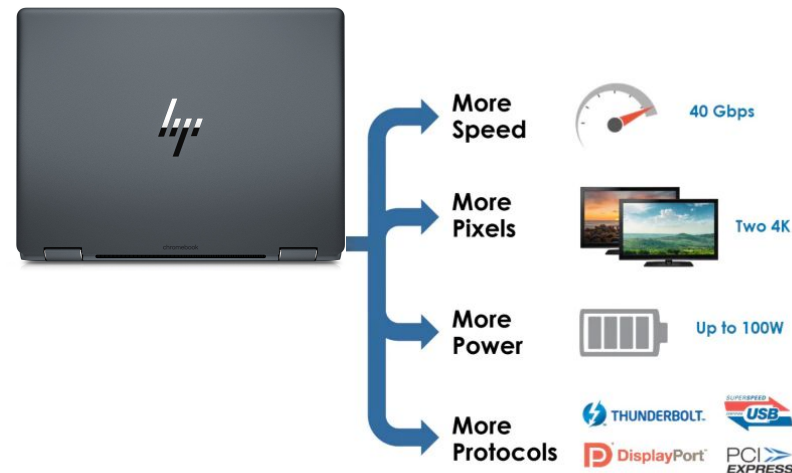
No rootkits.



# Drivers and peripherals

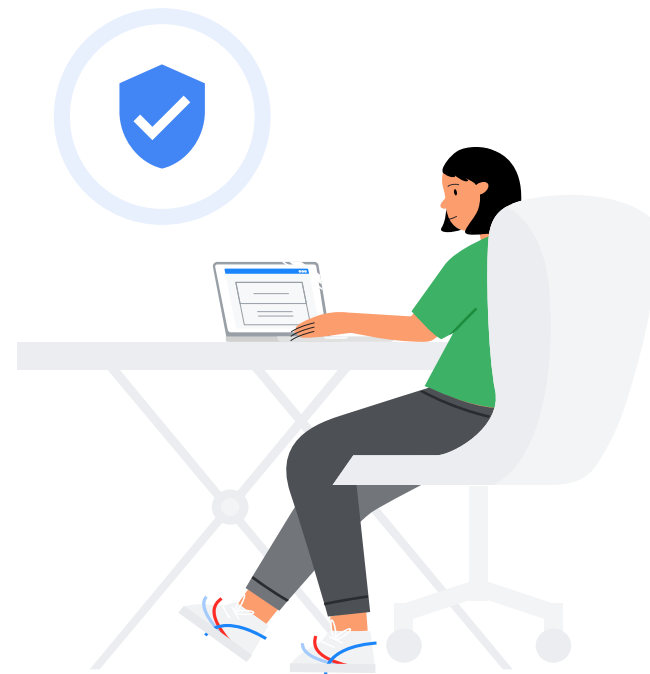
We constantly update the technologies supported in Chrome OS - last year we added support for USB4 and Thunderbolt

To support new capabilities and drivers we updated our security protection with USB-guard, PCIe-guard, fuzzing and drivers hardening.



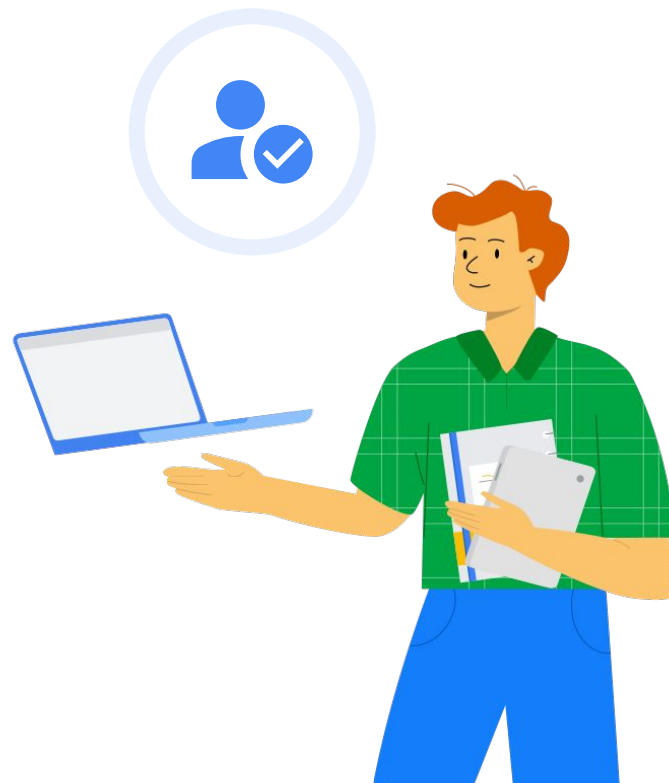
# Operating system

- Read only partitions
- Privilege separation
- Process sandboxing
- Data encryption
- Memory encryption



# User sessions

- Per-user encryption
- Cross-device policy compliance
- Chrome Browser:
  - Safe browsing
  - Sandboxing
  - Site isolation
  - HTTPS
  - Password alerts
  - more..
- Certificate enrollment & transparency



# OS Platform: Policies

Zero touch enroll, lock, wipe and control devices to secure Chrome devices

Remote lock or wipe Chrome devices to prevent unauthorized access

Set sign-in restrictions and forced re-enrollment to control corporate and personal access

Configure Chrome browser policies to secure users' access to web resources such as JavaScript, images, and plugins on the web



# OS Platform: App Delivery

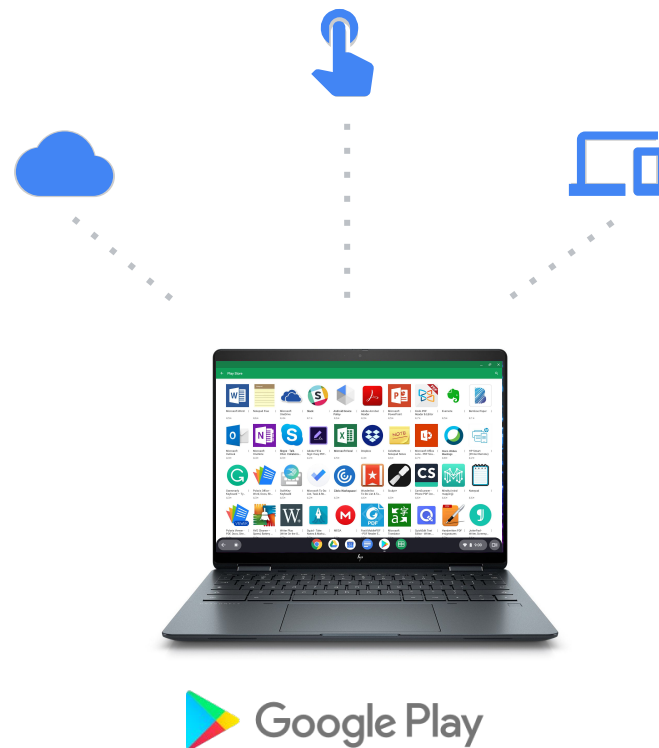
Managed Google Play enables control  
and deployment of apps

Server-side malware detection

Remote uninstall of malware

Allowlist and blocklists

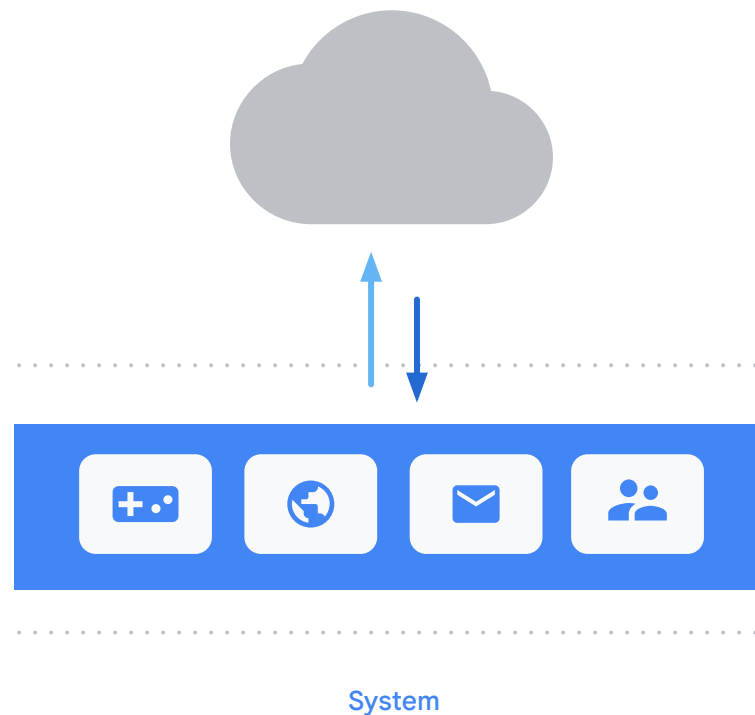
No side-loaded apps



# OS Updates

Built-in security to ensure the latest and most secure version of OS is running and any threats are contained

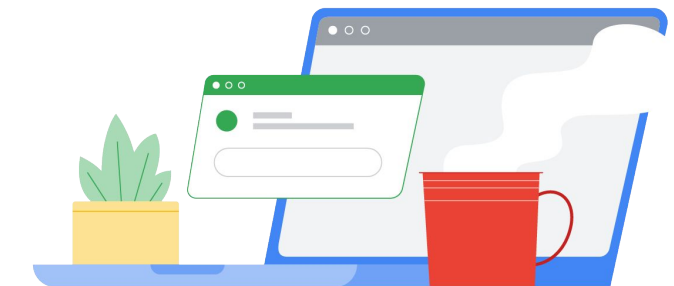
Seamless updates every 4 weeks with critical security bug updates as needed ensure that Chrome OS & browser are kept up to date



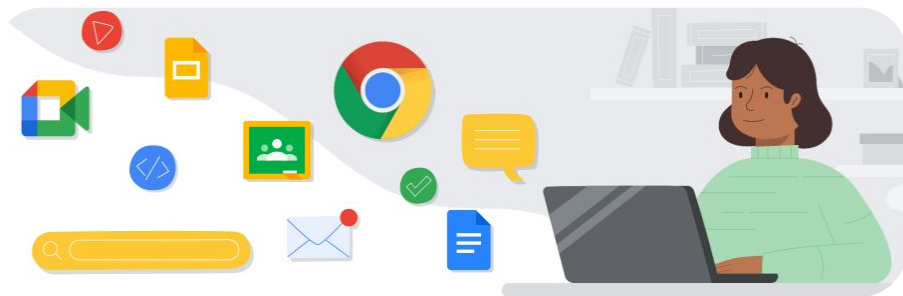
# Secure by default

Use the power of default to keep the users safe.

Firewall. Sandboxing. File Encryption. Verified boot.  
Updates. Security chip. and more..







# Thank you

[chromeenterprise.google/security](https://chromeenterprise.google/security)

Google for Education