

What?

Why?
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How?
oooooooooooo

Questions?

Hitchhiker Guide to Hardware Maintenance

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Porto Summer of Code, 2016

Outline

1 What?

2 Why?

- Heat
- Throttle

3 How?

- Tools
- Consumables
- How to

4 Questions?

Cleaning

- Remove heat sinks (laptops and desktops)
- Clean the fans and air vents
- Clean old thermal paste
- Apply thermal paste

Heat

Dust acts as a thermal insulator and reduces airflow, thereby reducing heat sink and fan performance.

Poor heat transfer due to poor thermal contact between components to be cooled and cooling devices.

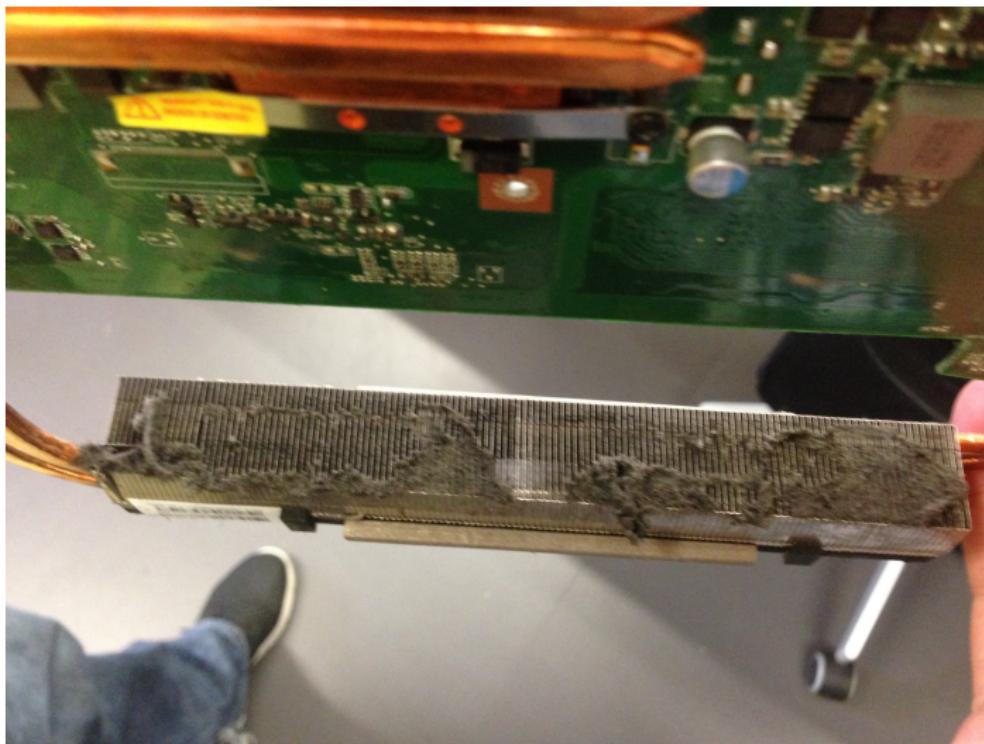
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Questions?

Dust



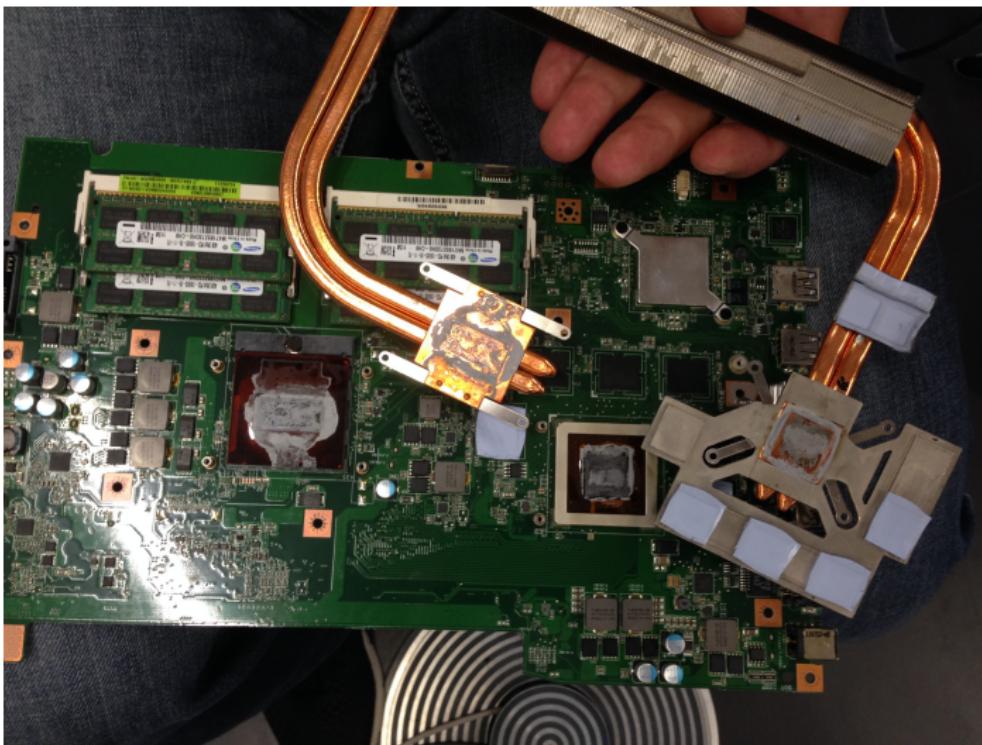
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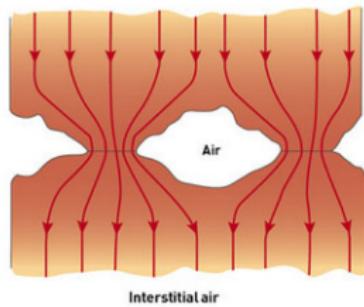
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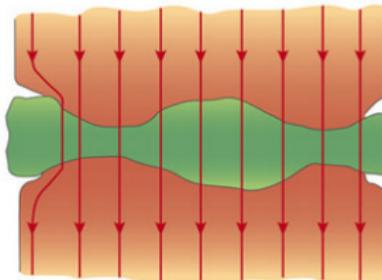
Dry TIM



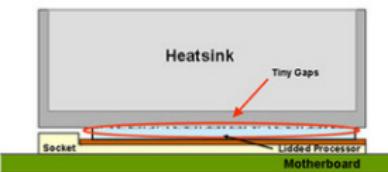
TIM?



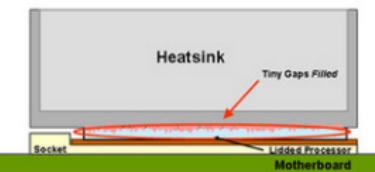
Interstitial air



Thermal interface material



No thermal interface material, tiny gaps exist.



Correct use of thermal interface material
fills the tiny gaps.

Throttle

Because high temperatures can significantly reduce life span or cause permanent damage to components, and the heat output of components can sometimes exceed the computer's cooling capacity, manufacturers often take additional precautions to ensure that temperatures remain within safe limits.

Throttling reduces the operating frequency and voltage of an integrated circuit or disables non-essential features of the chip to reduce heat output, often at the cost of slightly or significantly reduced performance.

Damage prevention

Most components can shut themselves down when high temperatures are detected to prevent permanent damage.

This may not completely guarantee long-term safe operation.

How?

- Search for "[model] disassembling" on YouTube/Google
- Watch/read the instructions (more than once)
- ????
- Profit

Opening

- Good quality screwdriver
- ESD safe gloves
- Anti-Static wrist strap
- Guitar picks
- Tweezers
- Magnetic pad (optional)

Cleaning

- Anti-Static Brush
- Dust Blower
- Microfiber Cleaning Cloths

Consumables

- Alcohol (70% solution is enough but the higher the percentage the better)
- Cotton swabs/balls
- Paper towel
- Thermal paste
- Thermal pads (optional)

Disassembling

- Don't use too much pressure on screws
- Use small increments of force to open plastic parts
- Don't use too much force to remove the heat sinks
- Place your screws (and every that comes out of the laptop) in a secure place

Important

Hardware is always right

Cleaning

- Use paper towels to remove the majority of old TIM
- Use a non-abrasive (soft plastic) spatula to remove "glued" TIM
- Use the cotton/swabs to completely clean the heat sink and circuit
- Check if any cleaning material is left on the parts

Important

Be careful removing the old TIM

Important

Try to save the thermal pads

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Cleaned Dust



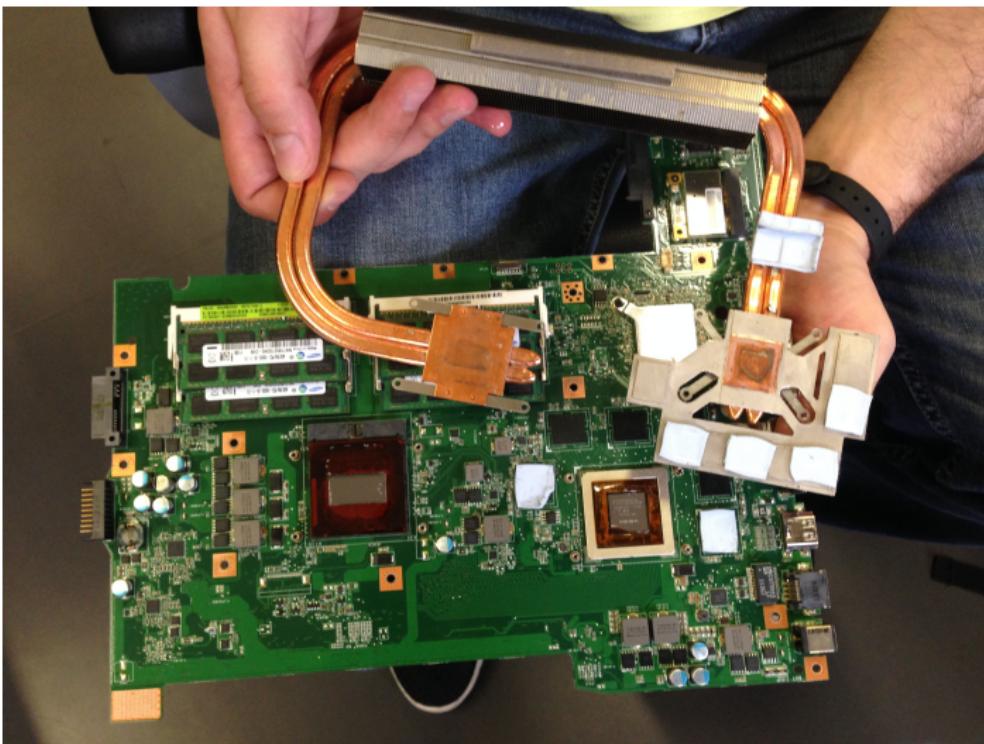
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Cleaned TIM



Thermal Paste



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Questions?

Thermal Paste



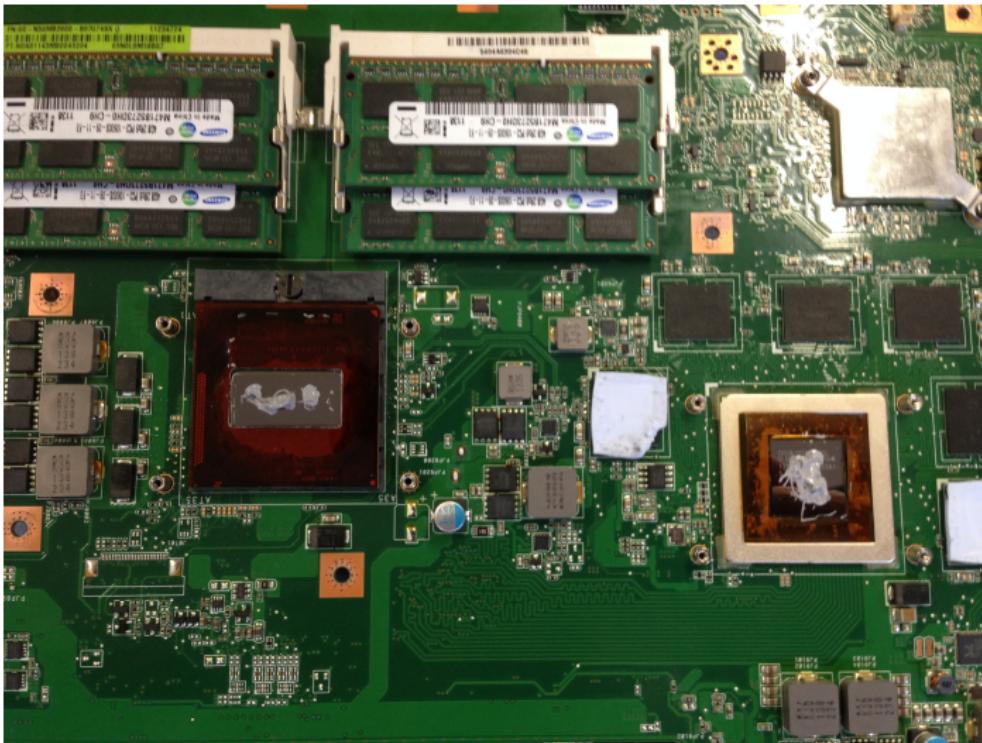
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Thermal Paste



Assemble

- Do it slowly
- Check if computer starts before closing it completely
- Check more than once that no screws and/or parts are forgotten

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Questions?

Go ahead, ask me anything (hardware related ^^).

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Let's GO

