Module 1

Introduction to A+
Form Factors, Cases, and Power Supplies

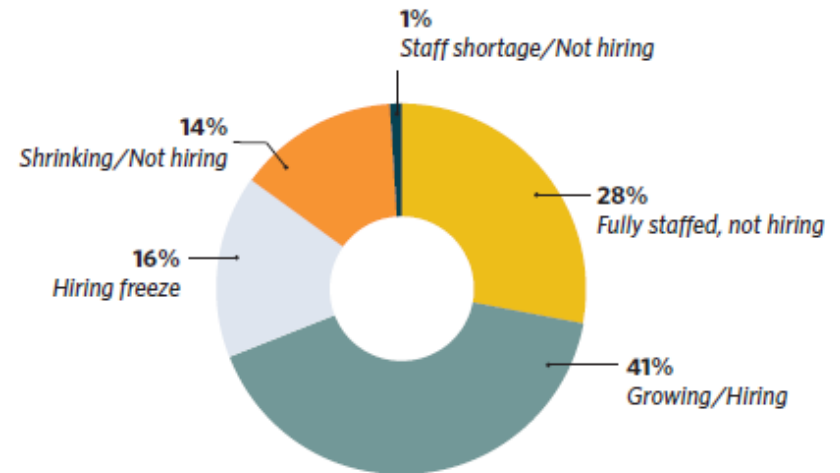# Certification Value– The More The Better

1. Technical certifications are worth more than degrees in this field
2. The number of certifications impact salary and jobs
3. Certifications lead to job promotions and raises

Future IT Worker Demand

1. Remains one of the most in-demand professions available
2. Needed in all industries
3. Companies are adding new tech support workers
4. Hiring by non-IT companies has generally outpaced those of IT companies 10-to-1
5. Focus on "talent"
   A. #1- Certifications
   B. #2- Job experience
   C. #3- Degreed candidates

IT Department Staffing

- 1% Staff shortage/Not hiring
- 14% Shrinking/Not hiring
- 16% Hiring freeze
- 28% Fully staffed, not hiring
- 41% Growing/Hiring

TechTarget's IT Salary Survey 2012

Objectives

1. CompTIA A+ Certification:
   A. Part 1: Hardware (Computer Maintenance I)
   B. Part 2: Software (Computer Maintenance II)

2. PC Hardware:
   A. 1.3 Differentiate form factors and cases
   B. 1.1 Choose an appropriate power supply

WHO IS COMPTIA & WHAT IS A+

Since 1982, the Computing Technology Industry Association (CompTIA), has been dedicated to advancing the global interests of information technology (IT) professionals and companies including manufacturers, distributors, resellers, and educational institutions.

CompTIA A+ Certification

1. International industry credential
2. Validates the knowledge of computer service technicians with the equivalent of 500 hours of hands-on experience
3. The standard in foundation-level
4. Vendor-neutral certification
5. Held by 900,000 IT professionals

CompTIA A+ Certification

1. **Jobs that use CompTIA A+**:
   A. Technical support specialist
   B. Field service technician
   C. IT support technician
   D. IT support administrator
   E. IT support specialist
   F. General entry-level IT positions

CompTIA A+ Certification

1. The latest version is CompTIA A+ requires two exams to become certified:

   A. **CompTIA A+ Exam #1** covers the fundamentals of computer technology, installation and configuration of PCs, laptops and related hardware, and basic networking.

   B. **CompTIA A+ Exam #2** covers the skills required to install and configure PC operating systems, as well as configuring common features for mobile operating systems.

2. Certifications are valid for three years from the date the candidate becomes certified.

Exam #1

This exam will cover:

Exam Domains	Percentage
PC Hardware	40%
Networking	27%
Laptops	11%
Printers	11%
Operational Procedures	11%
	100%

Exam #2

This exam will cover:

Exam Domains	Percentage
Operating Systems	33%
Security	22%
Mobile Devices	9%
Troubleshooting	36%
	100%

FORM FACTORS AND CASES

Form Factor

1. Describes the size, shape, and general makeup of a hardware components
2. Describes the compatibility of components
3. Affected components:
   A. Motherboard
   B. Power supply
   C. Case

Form Factor

Form Factor	Size	Usage
AT (Advanced Technology)	12 × 11–13 in	Obsolete, superseded by ATX.
ATX (Advanced Technology Extended)	12 × 9.6 in	Created by Intel in 1995. It is the most common form factor.
Micro-ATX	9.6 × 9.6 in	A smaller variant of the ATX form factor. Compatible with most ATX cases, but has fewer slots than ATX. Very popular for desktop and small form factor computers.
Mini-ATX	5.9 × 5.9 in	Designed for mobile CPUs with lower power requirement and less heat generation.
BTX (Balanced Technology Extended	12.8 × 10.5 in	A standard proposed by Intel as a successor to ATX in the early 2000s.

Form Factor

Form Factor	Size	Usage
DTX		A variation of ATX specification designed especially for small form factor PCs
Mini-ITX	6.7 × 6.7 in	A small, highly-integrated form factor, designed for small devices such as thin clients and set-top boxes.
Nano-ITX	4.7 × 4.7 in	Targeted at smart digital entertainment devices such as PVRs, media centers and Car PCs, and thin devices.
Pico-ITX	3.9 × 2.8 in	They often are used in custom media center computers, car computers and small home servers.

Determining the Form Factor
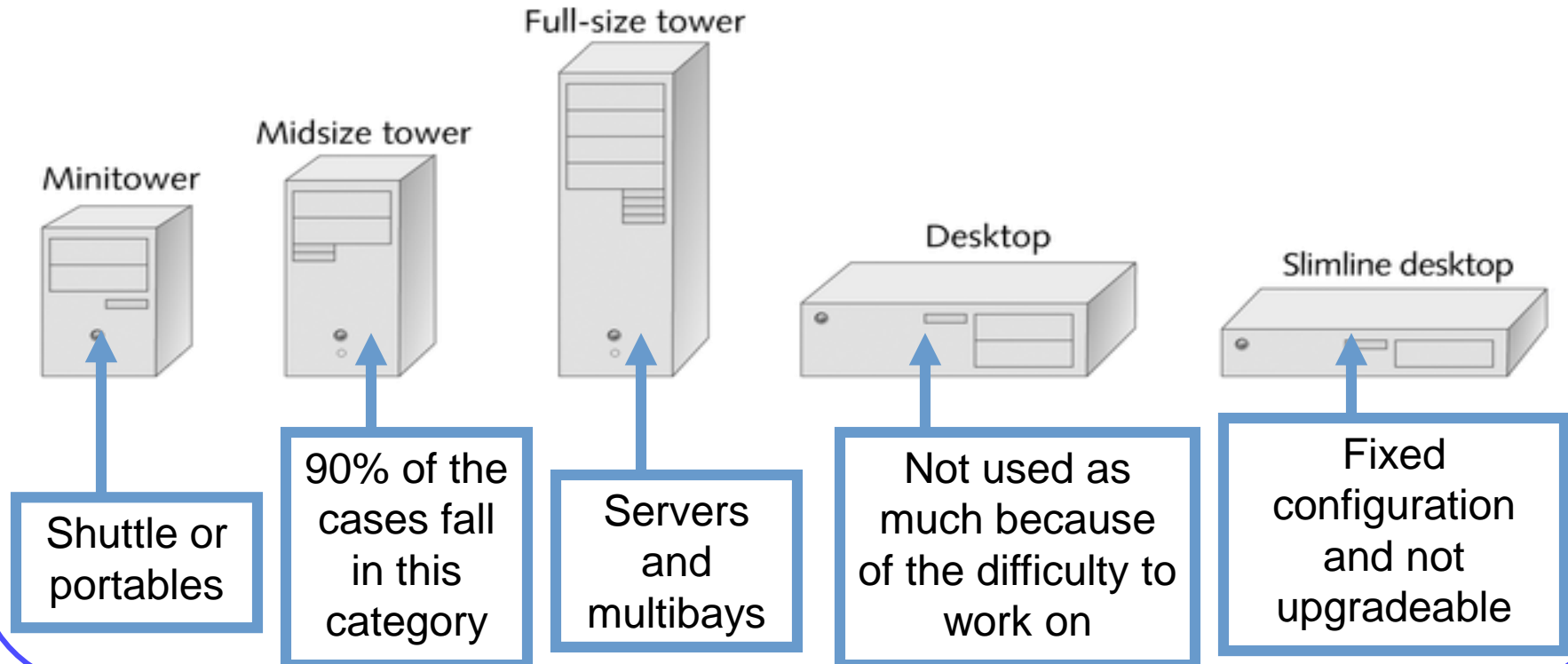
1. Power connector(s)
   A. P8 & P9 on AT
   B. 20 or 24 keyed connector on ATX, BTX, DTX, ITX
   C. Additional 12v power (4-8 pins) on ATX, BTX, DTX, ITX
2. Keyboard connectors on motherboard
   A. DIN or DIN5
   B. PS/2 or mini-DIN
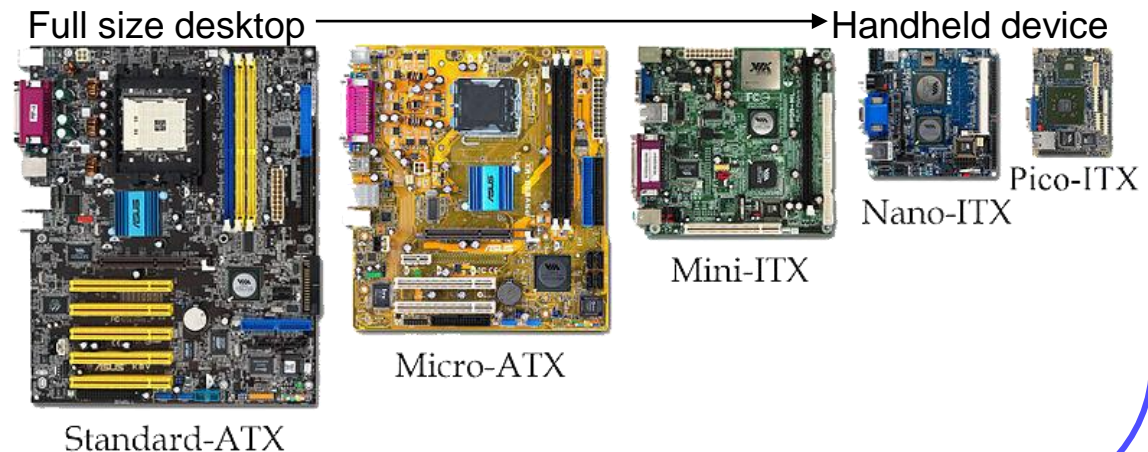3. I/O ports on motherboard
4. Size of motherboard

Types of Cases

1. Case fans provide the best cooling for components
2. Keep cases sealed for best air flow and minimize dust
3. Maintain positive air flow

Minitower

Midsize tower

Full-size tower

Desktop

Slimline desktop

Shuttle or portables

90% of the cases fall in this category

Servers and multibays

Not used as much because of the difficulty to work on

Fixed configuration and not upgradeable

Types of Motherboards

1. A case can hold smaller version of the same form factor but not larger.
2. An ATX case would hold:
   A. ATX
   B. Micro-ATX
   C. Mini-ATX

Full size desktop ⟶ Handheld device

Standard-ATX

Micro-ATX

Mini-ITX

Nano-ITX

Pico-ITX

POWER SUPPLIES

Power Supply

1. AC (alternating current)

    A. Cycles back and forth rather than traveling in only one direction

    B. Most economical way to transmit electricity

2. DC (direct current)

    A. Travels in only one direction

    B. Type of current required by most electronic devices, including computers

    C. Computer power supplies function as both a transformer and a rectifier

Computer Power Supply

Power Switch

Dual Voltage Selector

External Power Source

Cooling Fan
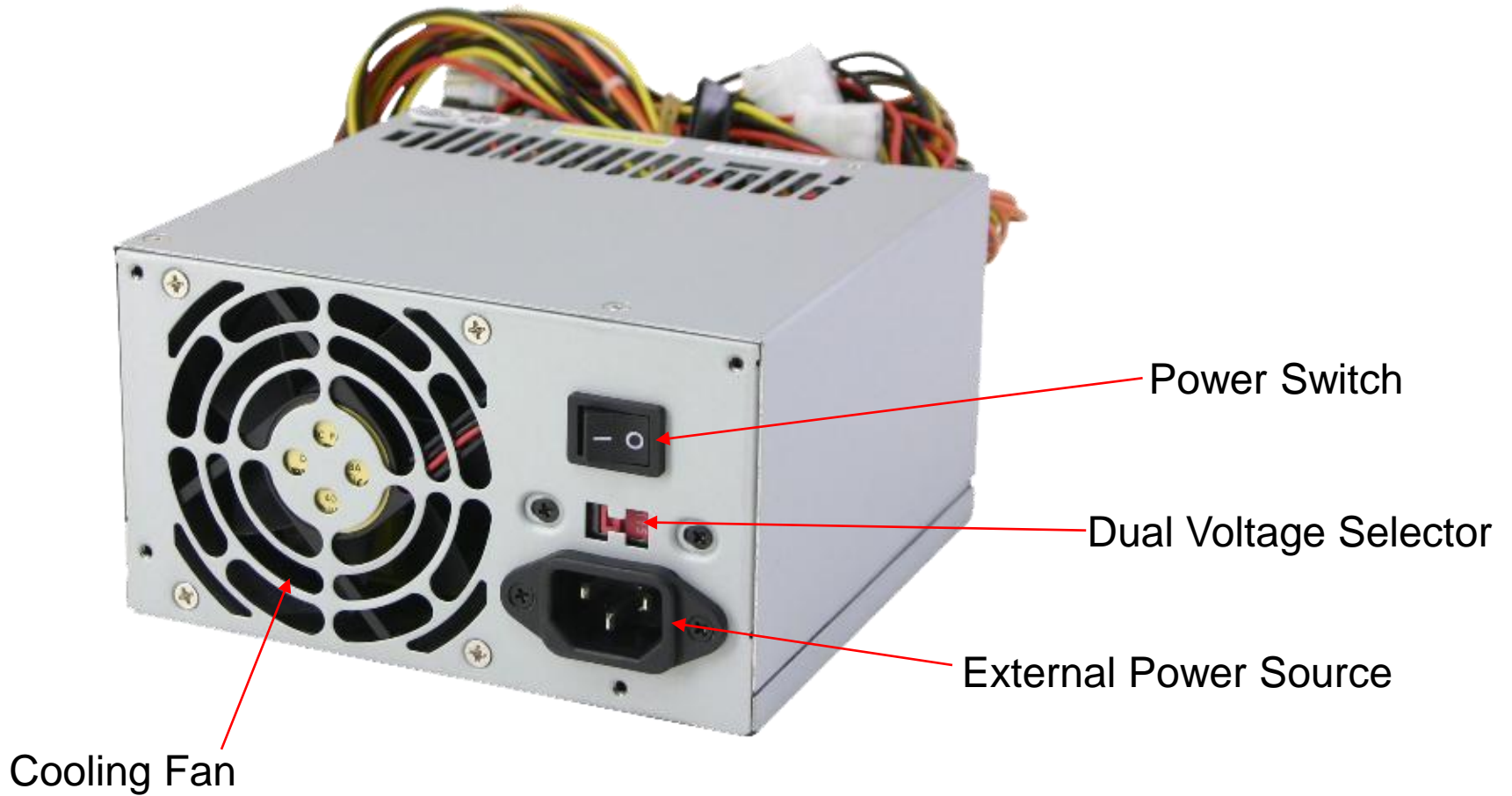
Computer Power Supply

1. Power supplies may be internal or external:

    A. Laptops are external AC adaptors

    B. Most desktops are internal

    C. Some servers have redundant power supplies

Laptop Power Supply

Server Power Supply

Micro-ITX

Troubleshooting Power Supplies

1. NEVER open the power supply case
2. Check the power switch is on
3. Check the voltage selector is correct
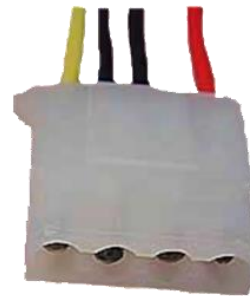4. Blinking light indicates under voltage

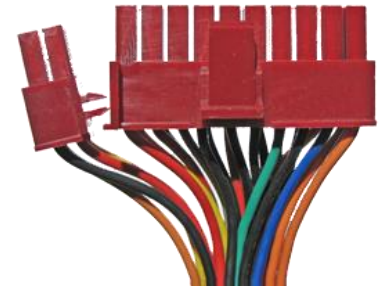# Power Connectors

1. The number of connectors is dependent on the wattage of the power supply
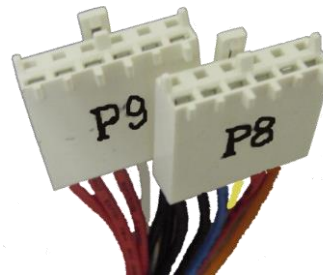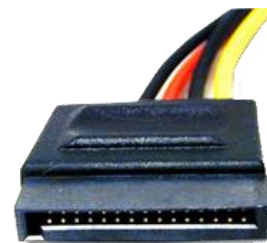

Berg

Molex

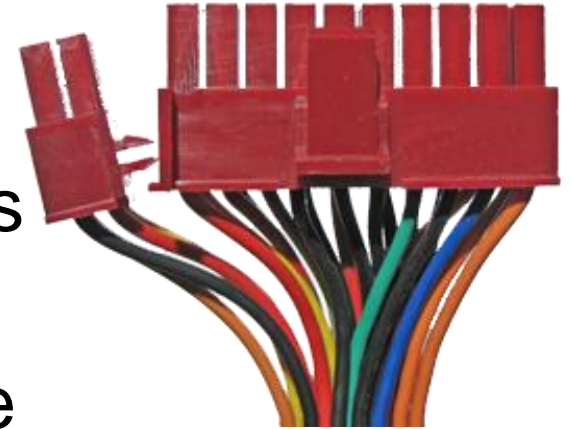20 or 24 pin connector

AT or P8/P9 connector
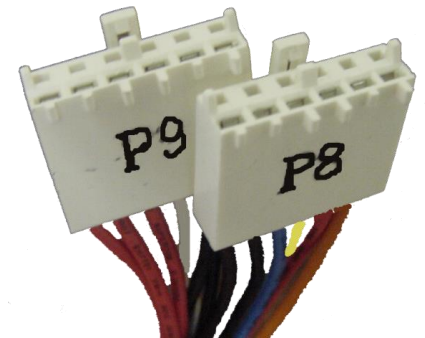

SATA connector

4, 6, or 8 pin connector

Main Power Connector

1. 20 or 24 pin keyed connector

   A. Power supplies over 400 watts usually have 24 pins.

   B. 4 extra pins used for dual core and up processors.

   C. You can buy 20 to 24 OR 24 to 20 pin adapters.

2. P8/P9 connectors were used on AT motherboards only

20 or 24 pin connector

AT or P8/P9 connector

Expansion Power Connectors

1. Berg connectors supply 12v power to floppy drives

2. Molex connectors supply 12v power to IDE hard drives, CD/DVD drives, tape drives and some video cards.

3. Molex is found on every desktop power supply.

4. SATA connectors supply 12v power to SATA drives

Berg   Molex

SATA connector

Auxiliary Power Connectors

1. 4- and 8-pin connectors have been used to provide extra power to Pentium 4 and up motherboards

2. 6- and 8-pin connectors are used to provide power to PCIe slots for devices like graphics cards

4, 6, or 8 pin connector

Power Supply Wire Colors

Voltage	Wire Color	Use	AT Power	ATX Power	Acceptable Voltage Range
+12v	Yellow	Disk drive motors, fans, cooling devices and the system bus slots	✓	✓	+10.8 to +13.2
-12v	Blue	Some types of serial port and early programmable ROM	✓	✓	-10.8 to -13.2
+3.3v	Orange	Most newer CPUs, some types of system memory, and AGP video cards		✓	+3.1 to +3.5
+5v	Red	Motherboards and earlier CPUs	✓	✓	+4.5 to +5.5
-5v	White	ISA bus cards	✓	✓	-4.5 to -5.5
0v	Black	Ground – Used to complete circuits with the other voltages	✓	✓	

Measurements of Electricity

Unit	Definition	An Example as Applied to a Computer
Volts (measures potential difference)	Abbreviated as V (for example, 120 V). Volts are measured by finding the potential difference between the electrical charges on either side of an electrical device in an electrical system.	An AT power supply supplies four separate voltages: +12 V, -12 V, +5 V, -5 V. An ATX power supply supplies these and also +3.3 V.
Amps or amperes (measures electrical current)	Abbreviated as A (for example, 1.5 A) Amps are measured by placing an ammeter in the flow of current and measuring that current.	A 17-inch monitor requires less than 2A to operate. A small laser printer uses about 3A. A CD-ROM drive uses about .3A.

Measures of Electricity

To help you understand, imagine water flowing through a pipe:

1. The volume or force of water that flows through the pipe is like the volume of electricity through a conductor; the volume or force is measured in **volts**.

2. The rate or speed of the water flowing through the pipe is like the rate of the electricity flowing through a conductor; the rate or speed is measured in **amps**.

Wattage

1. Total amount of power needed to operate an electrical device
2. Measured in watts
3. Calculated by multiplying volts by amps in a system (A x V = W)
4. In the US, AC current (V) comes out of the outlet at 120V @ 60Hz.

Calculating Wattage (A x V = W)

If you have a computer that draws 4 amps:

1. 4A x 120V = 480W (this is the maximum output of your computer.

2. 480 x .20 = 96 (It's a good idea to add 20% so the power supply does not run at its maximum)

3. 480 + 96 = 576W

4. Power supplies come in increments of 50 watts. So you would need a 600W power supply to run this computer

Note: 250W is the minimum size used in any computer system.

Summary

In the module, we discussed:

1. Form Factor and how it effects components
2. AC and DC current
3. Types of connectors
4. Power supply wire colors and voltages
5. Calculating Wattage