Before describing the two system specifications, the requirements for both clients must be examined. The main requirement is cost, followed by the utility of the system for the client’s profession. In addition to this, both systems need to have ample cooling and power. This will increase the overall reliability and upgradeability of the system, meaning the system will cost less and be more useful in the long-term.

Both systems must be upgradeable because the system requirements for software are likely to increase in the future. For example, the Windows XP Home Edition operating system, released in 2001, required a 0.3GHz processor, 128MB of RAM, and 1.5GB of hard disk space. Windows 8.1, released in 2013, required a 1.0GHz processor, 2048MB of RAM and 16GB of hard disk space. This increase holds true for almost every other piece of software in use today, from browsers to computer games. For this reason, hardware capacity must be greater than currently necessary to allow for future hardware and software upgrades. Greater capacity is particularly needed for the power supply unit (PSU), main memory (RAM), and hard disk.

[Windows XP spec](http://support.microsoft.com/kb/314865)

[Windows 8.1 spec](http://windows.microsoft.com/en-GB/windows-8/system-requirements)

The first specification is for a system to support a small businessman such as a plumber or electrician – a Sole Trader. The main system requirement besides the price is when the system is used for home entertainment. This is because the specifications of accounting and inventory management software are negligible when compared with the specs for running a modern operating system – this requirement will be easy to meet as long as there is additional RAM and hard drive space alongside the OS. Running entertainment software means a high-definition monitor is needed for watching films. Decoding DVDs and other video codecs is amply handled by most modern processors.

[POS Maid requirements](http://inventory-management.findthebest.com/l/14/POS-Maid)

[InFlow requirements](http://inventory-software-review.toptenreviews.com/inflow-details.html)

|  |  |  |  |
| --- | --- | --- | --- |
| Supplier | Type | Description | Price (£) |
| eBuyer | Operating System | Windows 8.1 | 80.03 |
| Scan | Processor | Intel i3-4130 (3.4Ghz) | 79.98 |
| Scan | Motherboard | Gigabyte GA-H87-HD3 | 70.64 |
| Scan | RAM | Corsair 4GB DDR3 | 31.68 |
| Scan | Hard Drive | Seagate 500GB Barracuda | 35.98 |
| Scan | PSU | 500W Corsair CX500 | 46.20 |
| Scan | Case | Corsair 200R | 47.04 |
| Scan | Monitor | iiyama 22” | 117.86 |
| Scan | Keyboard | LMS Data K9020M | 4.98 |
| Scan | Mouse | Zalman ZM-M100 | 4.55 |
| Scan | Optical Drive | LiteOn IHAS124-14 | 11.98 |
|  |  | Shipping (£) | 10.98 |
|  |  | Total (£) | 541.90 |

*Fig. 1: Sole Trader Specification – prices correct as of 13/03/2014*

The processor performs the mathematical calculations necessary for the software running on the system to do work for the user. Thus the processor is the most important part of the specification, as it has the greatest impact on system performance. Almost all modern processors will satisfy the needs of the Sole Trader specification, but the i3 processor selected has sufficient processor speed to make it reasonably useful for software written in five to ten years’ time. Power consumption is a worthwhile consideration for a budget system, and at this price point the Intel i3-4130 is more suitable than the equivalent AMD system (the AMD A10-6800K), consuming 54W instead of the AMD chip which consumes 100W.

A dedicated graphics card is not included as this would increase the cost and power consumption of the system. Chip makers now often include integrated graphics processing on their processors. These integrated graphics are actually quite powerful, and will allow the user to play reasonably resource-light games, such as browser games and small-scale 3D adventure games, without taxing the CPU. Integrated graphics also help when playing DVDs and media streamed from the internet.

Intel: [link](http://ark.intel.com/products/77480/Intel-Core-i3-4130-Processor-3M-Cache-3_40-GHz)

AMD: [link](http://shop.amd.com/uk/All/Detail/Processor/AD680KWOHLBOX?SearchFacets=category%3AProcessor)

Comparison: [link](http://www.hardware-revolution.com/best-cpu-processor-apu-january-2014-intel-amd/)

Price: £79.98 - Scan ([link](http://www.scan.co.uk/products/intel-core-i3-4130-s-1150-haswell-dual-core-34ghz-1150mhz-gpu-34x-ratio-54w-retail)) – 13/03/2014

Motherboard: [Gigabyte GA-H87-HD3](http://www.gigabyte.us/products/product-page.aspx?pid=4516#sp)

On a system without a dedicated graphics card, the motherboard provides all connectivity between the system and external peripherals. The key factor for selection is upgradability, because once a motherboard is installed in a system it is inconvenient to upgrade: usually all the other components must be removed beforehand. Other important factors include the provision of a variety of video ports to connect a monitor, and support for additional connectivity like USB3. USB3 is useful for connecting external peripherals such as hard disks, mice, keyboards, printers etc. The faster transfer rate versus USB2 makes transferring large files to an external hard disk take less time.

Reason: wide variety of graphics connectors (VGA, HDMI, DVI), plenty of space a processor upgrade and RAM or graphics card expansion.

Main factors: price, expansion, video output

Price: £70.64 - [link](http://www.scan.co.uk/products/gigabyte-ga-h87-hd3-intel-h87-s-1150-ddr3-sata-iii-sata-raid-pcie-30-%28x16%29-d-sub-dvi-d-hdmi-atx)

RAM: Corsair 4GB DDR3

Main memory temporarily stores data needed by the CPU to perform its tasks. It acts as a faster memory cache of the memory on the hard disk. All data in main memory is lost when the machine is powered off. For the Sole Trader spec, 4GB of memory is required, to keep the system fast and upgradeable. While Windows 8.1 requires only 2GB of main memory, it is important to leave room for applications to operate and memory optimisations such as virtual memory. One memory module is provided now, rather than two smaller modules. This leaves the other slots on the motherboard free so that the system is more cost effective to upgrade in the future.

Reason: room for OS and for applications, including HD videos and basic games.

Price: £31.68 - [link](http://www.scan.co.uk/products/4gb-corsair-ddr3-desktop-pc3-12800-%281600%29-non-ecc-unbuffered-cas-11-11-11-30-15v)

Hard Disk Drive: Seagate 500GB Barracuda

The hard drive contains a backup of data needed by the CPU. This data is not lost when the system is powered off. 500GB should be sufficient for the following reasons: Windows 8.1 requires 16GB of memory to operate. For the Sole Trader, accounting and stock-taking applications take up a very small percentage of the space available on modern disks. The main consideration here is the computer’s use for home entertainment, for which storage of a large music library or video collection may be required. In the case of media files, the more available the better, but the 400GB left after system use should be ample for a home user’s needs. A compressed movie generally takes up about 0.5GB of memory; meaning upwards of 700 videos could be stored on this disk.

Reason: price, plenty of room for OS, applications, music and video

Price: £35.98 - [link](http://www.scan.co.uk/products/500gb-seagate-st500dm002-barracuda-720014-sata-6gb-s-7200rpm-16mb-cache-85ms-ncq)

PSU: 500W Corsair CX500

Reason: reliable, plenty of room for expansion

The power supply unit (PSU) must have more than enough capacity to run the system. Overstretched power supplies will fail more frequently, because the power requirements of the system will fluctuate depending on use. For example, when a USB device is plugged into the system, it may draw power for its own operation, temporarily increasing the demand on the PSU. This PSU has a bronze 80PLUS certification, meaning it is designed to operate at about 80% efficiency even when usage is low. This will reduce heat output and overall power consumption.

[Fluctuations](http://smallbusiness.chron.com/effect-insufficient-power-supply-pc-66723.html)

[80PLUS](http://www.plugloadsolutions.com/80pluspowersupplies.aspx)

Price: £46.20 - [link](http://www.scan.co.uk/products/500w-corsair-builder-series-cx-cp-9020047-uk-80-plus-bronze-sli-crossfire-eps-12v-quiet-fan-atx-psu)

Case: Corsair 200R

When constructing a PC a good case helps immensely. The Corsair case has slots to store internal cables so they do not become tangled, and two built-in fans. These fans, along with the CPU fan provided by Intel, satisfy all cooling requirements for the system. Good air circulation ensures the system remains cool while operating, increasing the lifetime and reliability of the computer.

Price: £47.04 - [link](http://www.scan.co.uk/products/corsair-carbide-series-200r-compact-mid-tower-performance-case-with-usb-30-w-o-psu)

The peripherals selected are kept fairly basic for the Sole Trader, to keep the price low. The optical drive must have the ability to read DVDs for home entertainment purposes. The monitor is connectable to the main computer via VGA or DVI ports, and is large enough for watching video. The monitor also includes two built-in speakers so dedicated speakers are not necessary.

Total: £483.88

Optical Drive: LiteOn IHAS124-14

Reason: price, DVD capability

Price: £11.98 - [link](http://www.scan.co.uk/products/liteon-ihas124-14-24x-dvdr-8x-dvddl-dvdplusrw-x8-rw-x6-dvd-ram-x12-sata-black-oem)

Monitor: iiyama 22”

Reason: widescreen dimensions ideal for watching films, resolution also crisp enough for this

Price: £117.86 - [link](http://www.scan.co.uk/products/22-iiyama-xu2290hs-b1-ips-led-monitor-ultra-slim-bezel-hdmi-dvi-vga-1920x1080-250cd-m2-5m1-5ms-speak)

Keyboard: LMS Data K9020M

Reason: multimedia keys

Price: £4.98 - [link](http://www.scan.co.uk/products/lms-data-k9020m-black-multimedia-keyboard-with-9-hot-keys-usb)

Mouse: Zalman ZM-M100

Reason: it’s a mouse

Price: £4.55 - [link](http://www.scan.co.uk/products/zalman-zm-m100-usb-optical-mouse-3-button-with-scroll-wheel-1000dpi-usb)

The second specification is for a Web Designer. It has been kept broadly similar to the first: this is because many of the requirements overlap. The Web Designer will use their system for handling their accounts and producing invoices, but the most important requirement besides the price is that this system will produce the Web Designer’s work output. The system must accommodate video and image manipulation programs, such as Adobe Photoshop, Adobe Dreamweaver or Sony Vegas Pro. The system must also be resilient: in the event of hardware failure the Web Designer might lose valuable work and resources that might take a long time to recover.

|  |  |  |  |
| --- | --- | --- | --- |
| Supplier | Type | Description | Price (£) |
| eBuyer | Operating System | Windows 8.1 | 80.03 |
| Scan | Processor | [Intel i7-4770K (3.5GHz)](http://www.scan.co.uk/products/intel-core-i7-4770k-1150-haswell-quad-core-35ghz-39ghz-turbo-1250mhz-gpu-35x-ratio-84w-retail) | 245.64 |
| Scan | Motherboard | Gigabyte GA-H87-HD3 | 70.64 |
| Scan | RAM | [Corsair 16GB DDR3](http://www.scan.co.uk/products/16gb-%282x8gb%29-corsair-ddr3-vengeance-low-profile-jet-black-pc3-12800-%281600%29-non-ecc-cas-10-10-10-27-x) | 121.39 |
| Scan | Video Card | Gigabyte GTX 760 4GB | 230.11 |
| Scan | Hard Drive | [4 x Seagate 1TB Barracuda](http://www.scan.co.uk/products/1tb-seagate-st1000dm003-barracuda-720014-sata-6gb-s-7200rpm-64mb-cache-8ms-ncq-oem) | 167.76 |
| Scan | Boot Drive | [Kingston 120GB](http://www.scan.co.uk/products/120gb-kingston-ssdnow-v300-sata-iii-120g-ssd-bundle) | 73.34 |
| Scan | PSU | [760W Corsair AX760](http://www.scan.co.uk/products/760w-corsair-ax760-full-modular-80-plus-platinum-92-eff-eps-12v-sli-crossfire-1-x-120mm-fan-atx-psu) | 113.71 |
| Scan | Case | Corsair 200R | 47.04 |
| Scan | Monitor | 2 x iiyama 22” | 235.72 |
| Scan | Keyboard | LMS Data K9020M | 4.98 |
| Scan | Mouse | Zalman ZM-M100 | 4.55 |
| Scan | Optical Drive | LiteOn IHAS124-14 | 11.98 |
|  |  | Shipping (£) | 10.98 |
|  |  | Total (£) | 1417.87 |

*Fig. 2: Web Designer Specification – prices correct as of 03/04/2014*

Processor – [i7-4770K](http://ark.intel.com/products/75123/intel-core-i7-4770k-processor-8m-cache-up-to-3_90-ghz) - [£245.64](http://www.scan.co.uk/products/intel-core-i7-4770k-1150-haswell-quad-core-35ghz-39ghz-turbo-1250mhz-gpu-35x-ratio-84w-retail) - 03/04/2014

The programs used by the Web Designer will increase the computational load required of the processor: the more processing power supplied the faster and more responsive these programs will be. The same holds true for greater main memory capacity and greater hard disk storage capacity: large images and video will have to be loaded into both these areas for the Web Designer to do their job.

A dedicated video card is included in this build because Adobe Photoshop CS6 has been designed to take advantage of a dedicated video card. Having a video card will increase the responsiveness of this program when performing image transformations, such as scale and blur. The GTX 760 has 4GB of dedicated memory, and 192.2 GB/s memory bandwidth. A large amount of video memory means large images and video can be handled responsively. The memory bandwidth will improve image and video loading times because the data will reach the video card more quickly. The only trade-off made with the choice of video card is one of performance over power consumption. In the case of the web designer the decision is weighted in favour of performance, so that the Web Designer can use his time more effectively, without having to wait for videos or image manipulation previews to load into memory. Software optimised for graphics cards is likely to become more common in the future, so this build is future-proof as a result.

The build includes four hard drives, each 1.5 TBs in size. These are to be set up in a ‘RAID 1+0’ configuration. Using RAID 1+0, the drives are split into two pairs. Each pair contains a complete copy of the data on the system, meaning if one drive fails the other pair can be used to recover the data. This protects the Web Designer’s data from corruption. Within each pair, RAID 0 means that the data is ‘striped’ between the two drives. Data from a large chunk of memory, for example a video file, can be loaded into main memory in parallel using both drives at the same time, thus increasing the overall data read speed.

An SSD is provided to hold the operating system. Having the operating system booting from an SSD will reduce load times significantly. This is because an SSD does not have to wait for a physical disk to start spinning; the drive can instead start transferring data almost instantaneously.

[source](http://en.wikipedia.org/wiki/Solid-state_drive)

The Web Designer’s requirements for a monitor are identical to the Sole Trader since both must be able to view high fidelity video. Two monitors are supplied to the Web Designer since this is a common workflow aid for computer-aided design: one monitor is used to display tools and code, and the other can display the current output.

The two systems are similar in their basic composition, but they have crucial differences due to their different use cases. Each use case has been expanded upon to improve reliability and longevity. In both cases it is assumed that each customer will already have their own applications to transfer onto the system, but both systems have been built to amply deal with the more obvious software choices available. Both machines came in under budget, allowing the rest of the budget to be spent on software or set aside for future upgrades.

Same:

Motherboard

Case

Monitor

Keyboard

Mouse

PSU

Optical Drive

Different:

RAM – 16GB

[SSD](http://www.scan.co.uk/products/120gb-kingston-ssdnow-v300-sata-iii-120g-ssd-bundle) - Kingston 120GB

Cooler?

[GTX 760](http://www.scan.co.uk/products/4gb-gigabyte-gtx-760-oc-rev-2-28nm-pcie-30-6008mhz-gddr5-gpu-1085mhz-boost-1150mhz-cores-1152-dport-)

Scan £230.11

4GB on-board memory

170W power consumption

256-bit memory interface

192.2 GBps memory bandwidth

1152 CUDA cores