

Pure64 - v0.6.1 Manual

Pure64 must be loaded to the 16-bit memory address `0x0000:0x8000`

Pure64 expects that the up to 26KiB of data after it is the software that will be loaded to address `0x00000000000010000`.

System Requirements

A computer with at least one 64-bit Intel or AMD CPU (or anything else that uses the x86-64 architecture)

At least 2 MiB of RAM

The ability to boot via a hard drive, USB stick, or the network

Hard disk / USB boot

`bmfs_mbr.asm` in the bootsectors folder shows how to boot via a BMFS formatted drive.

Note: Once Pure64 has executed you will lose access the the USB drive unless you have written a driver for it. The BIOS was used to load from it and you can't use the BIOS in 64-bit mode.

Network boot

`pxestart.asm` in the bootsectors folder shows how to build a PXE image.

Memory Map

This memory map shows how physical memory looks after Pure64 is finished.

Start Address	End Address	Size	Description
0x0000000000000000	0x00000000000000FF	4 KiB	IDT - 256 descriptors (each descriptor is 16 bytes)
0x0000000000001000	0x0000000000001FFF	4 KiB	GDT - 256 descriptors (each descriptor is 16 bytes)
0x0000000000002000	0x0000000000002FFF	4 KiB	PML4 - 512 entries, first entry points to PDP at 0x3000
0x0000000000003000	0x0000000000003FFF	4 KiB	PDP - 512 enties
0x0000000000004000	0x0000000000007FFF	16 KiB	Pure64 Data
0x0000000000008000	0x000000000000FFFF	32 KiB	Pure64 - After the OS is loaded and running this memory is free again
0x0000000000010000	0x000000000004FFFF	256 KiB	PD - Room to map 64 GiB

Start Address	End Address	Size	Description
0x00000000000050000	0x0000000000009FFFF	320 KiB	Free
0x000000000000A0000	0x000000000000FFFFF	384 KiB	ROM Area
			VGA mem at 0xA0000 (128 KiB) Color text starts at 0xB8000
			Video BIOS at 0xC0000 (64 KiB)
			Motherboard BIOS at F0000 (64 KiB)
0x00000000000100000	0xFFFFFFFFFFFFFFFFF	1+ MiB	Your software is loaded here

When creating your Operating System or Demo you can use the sections marked free, however it is the safest to use memory above 1 MiB.

Information Table

Pure64 stores an information table in memory that contains various pieces of data about the computer before it passes control over to the software you want it to load.

The Pure64 information table is located at `0x0000000000005000` and ends at `0x00000000000057FF` (2048 bytes).

Memory Address	Variable Size	Name	Description
0x5000	64-bits	ACPI	Address of the ACPI tables
0x5008	32-bit	BSP_ID	APIC ID of the BSP
0x5010	16-bit	CPUSPEED	Speed of the CPUs in MegaHertz MHz
0x5012	16-bits	CORES_ACTIVE	The number of CPU cores that were activated in the system
0x5014	16-bit	CORES_DETECT	The number of CPU cores that were detected in the system
0x5016 - 0x501F			For future use
0x5020	32-bit	RAMAMOUNT	Amount of system RAM in Mebibytes MiB
0x5022 - 0x502F			For future use
0x5030	8-bit	IOAPIC_COUNT	Number of IO-APICs in the system
0x5031 - 0x503F			For future use

Memory Address	Variable Size	Name	Description
0x5040	64-bit	HPET	Base memory address for the High Precision Event Timer
0x5048 - 0x505F			For future use
0x5060	64-bit	LAPIC	Local APIC address
0x5068 - 0x507F	64-bit	IOAPIC	IO-APIC addresses (based on IOAPIC_COUNT)
0x5080	32-bit	VIDEO_BASE	Base memory for video (if graphics mode set)
0x5084	16-bit	VIDEO_X	X resolution
0x5086	16-bit	VIDEO_Y	Y resolution
0x5088	8-bit	VIDEO_DEPTH	Color depth
0x5100-	8-bit	APIC_ID	APIC ID's for valid CPU cores (based on CORES_ACTIVE)

A copy of the E820 System Memory Map is stored at memory address `0x0000000000004000`. Each E820 record is 24 bytes in length and the memory map is terminated by a blank record.

Variable	Variable Size	Description
Starting Address	64-bit	The starting address for this record
Length	64-bit	The length of memory for this record
Memory Type	32-bit	Type 1 is usable memory, Type 2 is not usable

For more information on the E820 Memory Map: [OSDev wiki on E820](#)