


1000111



IBM Personal Computer

CPU Clock Speed: 4.77MHz

CPU Cores: 1

Cache: None

RAM: 64KB


Secondary Storage: 160KB

Storage Type: Magnetic

Year: 1981

The IBM Personal Computer 5150 was so successful it became synonymous with the term "PC". With its open architecture, it quickly became an industry standard. Many IBM PC clones would follow, all using a command line interface called Microsoft Disk Operating System (MS-DOS).

1001012



NeXTcube

CPU Clock Speed: 25MHz

CPU Cores: 1

Cache: 8KB

RAM: 64MB


Secondary Storage: 400MB

Storage Type: Magnetic

Year: 1990

Launched by Steve Jobs, the NeXTcube was used by Tim Berners-Lee to design the World Wide Web at CERN. This also became the world's first web server. The server had a handwritten label that famously read: "This machine is a server. DO NOT POWER IT DOWN!!"

1011016



Tianhe-2 天河-2

CPU Clock Speed: 2.2GHz

CPU Cores: 384,000

Cache: 960GB

RAM: 1.4PB

Secondary Storage: 12.4PB

Storage Type: Solid State

Year: 2013

Tianhe-2 is one of the world's fastest supercomputers. Its CPUs and coprocessors help it achieve 33.86 petaFLOPS (quadrillion calculations per second). Tianhe-2, like many supercomputers is used for running simulations and government security.

1100018



Manchester Baby

CPU Clock Speed: 1.1KHz

CPU Cores: 1

Cache: None

RAM: 1024b


Secondary Storage: None

Storage Type: None

Year: 1948

The Manchester Baby, was the world's first electronic stored-program computer. Demonstrations of a replica Baby are still shown at the Science and Industry Museum in Manchester. The output is in (reverse) binary where 11000 would be 3 rather than 24.

110101A



ZX Spectrum

CPU Clock Speed: 3.5MHz

CPU Cores: 1

Cache: None

RAM: 48KB

Secondary Storage: 1MB

Storage Type: Magnetic

Year: 1982

Clive Sinclair intended for the Spectrum to be available to the masses and kept the price of the computer low. Software is still being released for "Speccy", despite being discontinued. Speccy bred a generation of programmers, laying the foundations for the British game development industry.

111001C



Samsung Q1 Ultra

CPU Clock Speed: 800MHz

CPU Cores: 1

Cache: 512KB

RAM: 1GB


Secondary Storage: 60GB

Storage Type: Magnetic

Year: 2007

This Ultra-Mobile PC features a unique split QWERTY keyboard. The Q1 ran the Microsoft Windows operating system, the form factor was larger than a smartphone but smaller than a netbook. Due to the dominance of tablet computers, the format was discontinued in 2012.

011000C



Raspberry Pi Zero W

CPU Clock Speed: 1GHz

CPU Cores: 1

Cache: 32KB

RAM: 512MB


Secondary Storage: 32GB

Storage Type: Solid State

Year: 2017

Priced at just \$9.60 (\$10), this incredible device features WiFi and Bluetooth connectivity. The Pi Zero W is capable of running Python, Scratch and Minecraft. Makers have also used the Pi Zero W to create retro consoles, multimedia servers, dashcams and projectors.

111111F



Alienware Area 51

CPU Clock Speed: 4.4GHz

CPU Cores: 16

Cache: 40MB

RAM: 64GB


Secondary Storage: 2TB

Storage Type: Solid State

Year: 2019

Alienware was founded in 1996 and was acquired by Dell in 2006. The Area 51 Threadripper edition is designed to handle any 4K game. Gaming PCs such as the Area 51 combine a powerful CPU and GPU along with a large amount of RAM and a PCIe Solid State Drive.

0100008



Mac Pro 5,1

CPU Clock Speed: 3.06GHz

CPU Cores: 12

Cache: 24MB

RAM: 64GB

Secondary Storage: 512GB

Storage Type: Solid State

Year: 2012

The iconic Mac Pro was designed by Jony Ive. Widely used in creative industries such as film, music and graphic design. Apple's Mac Pro is designed for internal expansion. Many continue to upgrade their Mac Pros and they are still in use after 8 years.

0011107



ThinkPad R51

CPU Clock Speed: 1.6GHz

CPU Cores: 1

Cache: 2MB

RAM: 2GB


Secondary Storage: 60GB

Storage Type: Magnetic

Year: 2004

Launched by IBM in 1992, the ThinkPad is a robust laptop. Testament to its build quality, it famously passed NASA's rigorous fire, radiation and thermal testing. It is also the only laptop certified for use on the International Space Station. The ThinkPad is now made by Lenovo.

0010105



Apple iPad

CPU Clock Speed: 1GHz

CPU Cores: 1

Cache: 576KB

RAM: 256MB


Secondary Storage: 64GB

Storage Type: Solid State

Year: 2010

The iPad was designed by British designer Jony Ive. The iconic tablet was launched by Steve Jobs and although the iPad was not the first tablet, its success came from the iPad's simplicity and intuitive user interface. Apple have sold over 360 million iPads since 2010.

0001002



Raspberry Pi 4 Model B

CPU Clock Speed: 1.5GHz

CPU Cores: 4

Cache: 1032KB

RAM: 4GB


Secondary Storage: 32GB

Storage Type: Solid State

Year: 2019

Designed by Eben Upton, this credit card sized computer is renowned for being affordable and versatile. Since its initial launch in 2012, 25 million Pis have been sold. Creative projects include electric skateboards and retro gaming consoles such as the NES.

0000101



BBC Micro Bit

CPU Clock Speed: 16MHz

CPU Cores: 1

Cache: None

RAM: 16KB

Secondary Storage: 256KB

Storage Type: Solid State

Year: 2016

Featuring an accelerometer, a 25 LED display and Bluetooth connectivity, the Micro Bit can be programmed using blocks or Python. This tiny computer has been used to make wearables, bike lights and even a weather station.

Credits

Thanks to Zi Chan-Lau and Thomas Bird for providing the inspiration for this project; Suki, Zi, Q, Mum, Dad, Anita, Steve, Uncle Tung, Leila Lassani, Lloyd Stevens, Jaime Vega, Govin Tong, Jamie Brownhill, Agneta Obirek and Sahima Patel for your encouragement and support; Martin Campbell-Kelly for developing my interest in computer history; and Carl Stratton, Jaime Vega, Andy Swann and Elizabeth Campbell for your comments on the design. Finally, thank you to all the students at Central Foundation Boys' School.

This project was made possible thanks to the generous contributions of The Creative Commons Community:

Card #	Author	License
020	Oak Ridge National Laboratory	CC BY 2.0
112	Gareth Halfacree	CC BY SA 2.0
2	Michael Jentler	CC BY SA 4.0
3,9,13,14,16,19,23	Evon-Arnas	Public Domain
4	Drummyfish	CC0
5	Justin14	CC BY SA 3.0 Unported
6	Red	CC BY 3.0 Unported
7	Andre Karwath	CC BY SA 2.5
8	Zach Vega	CC BY SA 4.1
10	U.S. Federal Government	Public Domain
11	Monnor	CC0
15	Nouriss Perce	CC BY 2.0
17	Rubén de Riquelme	CC BY SA 3.0 Unported
18	Rama & Musae Boia	CC BY SA 2.0
21	US Department of Energy	Public Domain
22	Sam Cuvell	CC BY SA
24	Geni	CC BY SA
26	Bill Bertom	CC BY SA 2.5 Generic
27	Serac	Public Domain
28	Felix Winkelkemper	CC BY SA 2.0
29	Chen-fang Liu	CC BY 2.0
30	Karlis Damjanis	CC BY 2.0
31	designmilk	CC BY SA 2.0

All product and company names are trademarks or registered trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them. While every attempt has been made to ensure that the information in this game is correct, Computer Combat is not responsible for any errors. Corrections or comments can be submitted at: www.computercombatcards.com

Instructions for Trumps

The word "trump" comes from the Latin word "triumphus" meaning "a triumph". A trump card refers to a card which outranks all other cards.

- The dealer gives each player an equal number of cards.
- The player to the left of the dealer starts by choosing a category on their top card and reading out the value e.g. "Year: 1985"
- The player with the best value for the chosen category wins that round and takes everyone else's cards from that round.

- CPU Clock Speed: The highest clock speed wins; GHz followed by MHz, KHz and Hz.
- CPU Cores: The most cores wins.
- Cache, RAM and Secondary Storage: The most memory wins; PB followed by TB, GB, MB, KB, B and b.
- Storage Type: Solid state is the fastest, followed by magnetic and optical.
- Year: The oldest computer wins.

- If there is a draw, the cards are kept in a pile and the players continue until there is a winner. The winner of the round takes the pile.
- If you run out of cards, you are out.
- The winner is the player who has all the cards at the end of the game.

Instructions for 31

This is a 5-bit version of the game known as 21. The aim is to try to score 31 or as close to 31 as possible.


- Each player takes a random card from the deck. Whoever has the highest card value takes the role of the server. Every other player is known as a client.
- The server gives each client two cards from the stack of cards. The server also deals themselves two cards, one face up and the other face down.
- Starting from the server's left, each client can request cards from the stack by saying "pop". If the client does not want any more cards, they say "stop" and it is the next client's turn.
- If a client's cards add up to more than 31, they have an "overflow error" and they are out.
- The server may also "pop" or "stop" to get 31.
- Once all players say "stop" in the same round, everyone reveals their cards and the player closest to 31 wins the game.

N.B. If your opening hand is 31, you must say "31" and you win by default.

A cheat sheet is provided to help players who are unfamiliar with binary and hexadecimal. Further videos that explain 31, trumps and other algorithm games can be found at: www.computercombatcards.com

Cheat Sheet

Denary	Binary	Hexadecimal
0	00000	00
1	00001	01
2	00010	02
3	00011	03
4	00100	04
5	00101	05
6	00110	06
7	00111	07
8	01000	08
9	01001	09
10	01010	0A
11	01011	0B
12	01100	0C
13	01101	0D
14	01110	0E
15	01111	0F
16	10000	10
17	10001	11
18	10010	12
19	10011	13
20	10100	14
21	10101	15
22	10110	16
23	10111	17
24	11000	18
25	11001	19
26	11010	1A
27	11011	1B
28	11100	1C
29	11101	1D
30	11110	1E
31	11111	1F



These sample cards are licensed under a Creative Commons Attribution-ShareAlike 4.0 International license. (CC BY-SA 4.0)

Cards Designed by William Lau.

Full physical packs are available from:

computercombatcards.com

10001

11



IBM Personal Computer

CPU Clock Speed: 4.77MHz

CPU Cores: 1

Cache: None

RAM: 64KB

Secondary Storage: 160KB

Storage Type: Magnetic

Year: 1981

The IBM Personal Computer 5150 was so successful it became synonymous with the term "PC". With its open architecture, it quickly became an industry standard. Many IBM PC clones would follow, all using a command line interface called Microsoft Disk Operating System (MS-DOS).

10010

12



NeXTcube

CPU Clock Speed: 25MHz

CPU Cores: 1

Cache: 8KB

RAM: 64MB

Secondary Storage: 400MB

Storage Type: Magnetic

Year: 1990

Launched by Steve Jobs, the NeXTcube was used by Tim Berners-Lee to design the World Wide Web at CERN. This also became the world's first web server. The server had a handwritten label that famously read: "This machine is a server. DO NOT POWER IT DOWN!!"

10110

16



Tianhe-2 天河-2

CPU Clock Speed: 2.2GHz

CPU Cores: 384,000

Cache: 960GB

RAM: 1.4PB

Secondary Storage: 12.4PB

Storage Type: Solid State

Year: 2013

Tianhe-2 is one of the world's fastest supercomputers. Its CPUs and coprocessors help it achieve 33.86 petaFLOPS/s (quadrillion calculations per second). Tianhe-2, like many supercomputers is used for running simulations and government security.

11000

18



Manchester Baby

CPU Clock Speed: 1.1KHz

CPU Cores: 1

Cache: None

RAM: 1024b

Secondary Storage: None

Storage Type: None

Year: 1948

The Manchester Baby, was the world's first electronic stored-program computer. Demonstrations of a replica Baby are still shown at the Science and Industry Museum in Manchester. The output is in (reverse) binary where 11000 would be 3 rather than 24.

11010

1A



ZX Spectrum

CPU Clock Speed: 3.5MHz

CPU Cores: 1

Cache: None

RAM: 48KB

Secondary Storage: 1MB

Storage Type: Magnetic

Year: 1982

Clive Sinclair intended for the Spectrum to be available to the masses and kept the price of the computer low. Software is still being released for "Speccy", despite being discontinued. Speccy bred a generation of programmers, laying the foundations for the British game development industry.

11100

1C



Samsung Q1 Ultra

CPU Clock Speed: 800MHz

CPU Cores: 1

Cache: 512KB

RAM: 1GB

Secondary Storage: 60GB

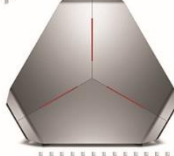
Storage Type: Magnetic

Year: 2007

This Ultra-Mobile PC features a unique split QWERTY keyboard. The Q1 ran the Microsoft Windows operating system. The form factor was larger than a smartphone but smaller than a netbook. Due to the dominance of tablet computers, the format was discontinued in 2012.

11111

1F



Alienware Area 51

CPU Clock Speed: 4.4GHz

CPU Cores: 16

Cache: 40MB

RAM: 64GB

Secondary Storage: 2TB

Storage Type: Solid State

Year: 2019

Alienware was founded in 1996 and was acquired by Dell in 2006. The Area 51 Threadripper edition is designed to handle any 4K game. Gaming PCs such as the Area 51 combine a powerful CPU and GPU along with a large amount of RAM and a PCIe Solid State Drive.

Instructions for 31

This is a 5-bit version of the game known as 21. The aim is to try to score 31 or as close to 31 as possible.

1. Each player takes a random card from the deck. Whoever has the highest card value takes the role of the server. Every other player is known as a client.

2. The server gives each client two cards from the stack of cards. The server also deals themselves two cards, one face up and the other face down.

3. Starting from the server's left, each client can request cards from the stack by saying "pop". If the client does not want any more cards, they say "stop" and it is the next client's turn.

4. If a client's cards add up to more than 31, they have an "overflow error" and they are out.

5. The server may also "pop" or "stop" to get 31.

6. Once all players say "stop" in the same round, everyone reveals their cards and the player closest to 31 wins the game.

N.B. If your opening hand is 31, you must say "31" and you win by default.

A cheat sheet is provided to help players who are unfamiliar with binary and hexadecimal. Further videos that explain 31, Trumps and other algorithm games can be found at: www.computercombatcards.com

Cheat Sheet

Denary	Binary	Hexadecimal
0	00000	00
1	00001	01
2	00010	02
3	00011	03
4	00100	04
5	00101	05
6	00110	06
7	00111	07
8	01000	08
9	01001	09
10	01010	0A
11	01011	0B
12	01100	0C
13	01101	0D
14	01110	0E
15	01111	0F
16	10000	10
17	10001	11
18	10010	12
19	10011	13
20	10100	14
21	10101	15
22	10110	16
23	10111	17
24	11000	18
25	11001	19
26	11010	1A
27	11011	1B
28	11100	1C
29	11101	1D
30	11110	1E
31	11111	1F



These sample cards are licensed under a Creative Commons Attribution-ShareAlike 4.0 International license. (CC BY-SA 4.0)

Cards Designed by William Lau.

Full physical packs are available from:

computercombatcards.com

01100

0C



Raspberry Pi Zero W

CPU Clock Speed: 1GHz

CPU Cores: 4

Cache: 32KB

RAM: 512MB

Secondary Storage: 32GB

Storage Type: Solid State

Year: 2017

Priced at just £9.60 (\$10), this incredible device features WiFi and Bluetooth connectivity. The Pi Zero W is capable of running Python, Scratch and Minecraft. Makers have also used the Pi Zero W to create retro consoles, multimedia servers, dashcams and projectors.

01000

08



Mac Pro 5,1

CPU Clock Speed: 3.06GHz

CPU Cores: 12

Cache: 24MB

RAM: 64GB

Secondary Storage: 512GB

Storage Type: Solid State

Year: 2012

The iconic Mac Pro was designed by Jony Ive. Widely used in creative industries such as film, music and graphic design, Apple's Mac Pro is designed for internal expansion. Many continue to upgrade their Mac Pros and they are still in use after 8 years.

00111

07



ThinkPad R51

CPU Clock Speed: 1.6GHz

CPU Cores: 1

Cache: 2MB

RAM: 2GB

Secondary Storage: 60GB

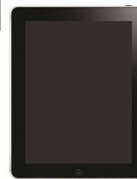
Storage Type: Magnetic

Year: 2004

Launched by IBM in 1992, the ThinkPad is a robust laptop. Testament to its build quality, it famously passed NASA's rigorous fire, radiation and thermal testing. It is also the only laptop certified for use on the International Space Station. The ThinkPad is now made by Lenovo.

00101

05



Apple iPad

CPU Clock Speed: 1GHz

CPU Cores: 1

Cache: 576KB

RAM: 256MB

Secondary Storage: 64GB

Storage Type: Solid State

Year: 2010

The iPad was designed by British designer Jony Ive. The iconic tablet was launched by Steve Jobs and although the iPad was not the first tablet, its success came from the iPad's simplicity and intuitive user interface. Apple have sold over 360 million iPads since 2010.

Cheat Sheet

Denary	Binary	Hexadecimal
0	00000	00
1	00001	01
2	00010	02
3	00011	03
4	00100	04
5	00101	05
6	00110	06
7	00111	07
8	01000	08
9	01001	09
10	01010	0A
11	01011	0B
12	01100	0C
13	01101	0D
14	01110	0E
15	01111	0F
16	10000	10
17	10001	11
18	10010	12
19	10011	13
20	10100	14
21	10101	15
22	10110	16
23	10111	17
24	11000	18
25	11001	19
26	11010	1A
27	11011	1B
28	11100	1C
29	11101	1D
30	11110	1E
31	11111	1F

00010

02



Raspberry Pi 4 Model B

CPU Clock Speed: 1.5GHz

CPU Cores: 4

Cache: 1032KB

RAM: 4GB

Secondary Storage: 32GB

Storage Type: Solid State

Year: 2019

Designed by Eben Upton, this credit card sized computer is renowned for being affordable and versatile. Since its initial launch in 2012, 25 million Pis have been sold. Creative projects include electric skateboards and retro gaming consoles such as the NES.

00001

01



BBC Micro Bit

CPU Clock Speed: 16MHz

CPU Cores: 1

Cache: None

RAM: 16KB

Secondary Storage: 256KB

Storage Type: Solid State

Year: 2016

Featuring an accelerometer, a 25 LED display and Bluetooth connectivity. The Micro Bit can be programmed using blocks or Python. This tiny computer has been used to make wearables, bike lights and even a weather station.

Credits

Thanks to Zi Chan-Lau and Thomas Bird for providing the inspiration for this project; Suki, Zi, Q, Mum, Dad, Anita, Steve, Uncle Tung, Leila Lassami, Lloyd Stevens, Jaime Vega, Gavin Tong, Jamie Brownhill, Agata Obirek and Sahima Patel for your encouragement and support; Martin Campbell-Kelly for developing my interest in computer history; and Carl Stratton, Jaime Vega, Andy Swann and Elizabeth Campbell for your comments on the design. Finally, thank you to all the students at Central Foundation Boys' School.

This project was made possible thanks to the generous contributions of the Creative Commons Community:

Card #	Author	License
0,20	Oak Ridge National Laboratory	CC BY 2.0
1,12	Gareth Halfacree	CC BY SA 2.0
2	Michael Henzler	CC BY SA 4.0
3,9,13,14,16,19,23	Evan-Amos	Public Domain
4	Drummyfish	CC0
5	Justin14	CC BY SA 3.0 Unported
6	Red	CC BY 3.0 Unported
7	André Karwath	CC BY SA 2.5
8	Zach Vega	CC BY SA 4.1
10	U.S. Federal Government	Public Domain
11	Moraoar	CC0
15	Maurizio Pesce	CC BY 2.0
17	Ruben de Rijcke	CC BY SA 3.0 Unported
18	Roma & Musée Bolo	CC BY SA 2.0
21	US Department of Energy	Public Domain
22	Sam Churchill	CC BY SA
24	Geri	CC BY SA
26	Bill Bertram	CC BY SA 2.5 Generic
27	Sernot	Public Domain
28	Felix Winkelkemper	CC BY SA 2.0
29	Cheon Fong Liew	CC BY 2.0
30	Kārlis Dambāns	CC BY 2.0
31	designmilk	CC BY SA 2.0

All product and company names are trademarks™ or registered® trademarks of their respective holders. Use of them does not imply any affiliation with or endorsement by them. While every attempt has been made to ensure that the information in this game is correct, Computer Combat is not responsible for any errors. Corrections or comments can be submitted at: www.computercombatcards.com

Instructions for Trumps

The word "trump" comes from the Latin word "triumphus" meaning "a triumph". A trump card refers to a card which outranks all other cards.

1. The dealer gives each player an equal number of cards.

2. The player to the left of the dealer starts by choosing a category on their top card and reading out the value e.g. "Year: 1985"

3. The player with the best value for the chosen category wins that round and takes everyone else's cards from that round:

- CPU Clock Speed: The highest clock speed wins; GHz followed by MHz, KHz and Hz.

- CPU Cores: The most cores wins.

- Cache, RAM and Secondary Storage: The most memory wins; PB followed by TB, GB, MB, KB, B and b.

- Storage Type: Solid state is the fastest, followed by magnetic and optical.

- Year: The oldest computer wins.

4. If there is a draw, the cards are kept in a pile and the players continue until there is a winner. The winner of the round takes the pile.

5. If you run out of cards, you are out.

6. The winner is the player who has all the cards at the end of the game.



These sample cards are licensed under a Creative Commons Attribution-ShareAlike 4.0 International license. (CC BY-SA 4.0)

Cards Designed by William Lau.

Full physical packs are available from:

computercombatcards.com