

Chapter 1

Arcade Games and Computer Arcade Game Platforms

In this chapter, you'll learn about:

- ♦ **Arcade game sub-genres**
- ♦ **Pong games**
- ♦ **Maze/chase games**
- ♦ **Shooters**
- ♦ **Puzzlers**
- ♦ **Platformers**
- ♦ **Popular arcade game platforms**

What's an Arcade Game?

Defining exactly what a computer arcade game is can be a difficult thing to do these days, especially when you consider all of the technological advances that have been made in the gaming industry over the years.

An arcade game can be many things and the arcade genre is simply too broad to define with one sweeping statement. You see, arcade games can encompass everything from games with mindless and gratuitous violence to games that require intricate problem solving techniques. To further cloud the issue, the action in an arcade game can take place on a single screen or over multiple levels. These levels can be static or completely dynamic with scrolling occurring in all four directions. And, so on and so on....

To make the concept of the arcade game somewhat easier to comprehend, I've identified five arcade game sub-genres that run the gamut of the arcade game spectrum.

Arcade Game Sub-Genres

- Maze/chase games
- Pong games
- Shooters
- Puzzlers
- Platformers

Maze/Chase Games

Maze/chase games came into their own during the first arcade game explosion of the early 1980s and eventually would become one of the defining, if not the most endearing, examples of the various arcade genres.

All maze/chase games possess the same basic characteristics: the player navigates an on-screen character through a maze of obstacles to achieve a specific goal. In many instances, this character is being chased by other on-screen characters in an attempt to prevent them from accomplishing their objective.

Maze/chase games are one of the few types of arcade games that actually emphasize strategy over the speed of one's reflexes, although no one can deny that the latter helps too. Maze/chase games come in many flavors and range from the very simple with only a few different game elements to very complex ones that include dozens or even hundreds of different game elements.

It's interesting to point out that virtually all of the action in the average maze/chase game occurs within the confines of a single *playfield*, or game screen. There

is seldom any scrolling employed. Instead, these games rely on multiple game levels to keep the user's interest in the game.

Maze/Chase Sub-Genre Examples:

- *Pac-Man* (basic)
- *Dig Dug* (advanced)

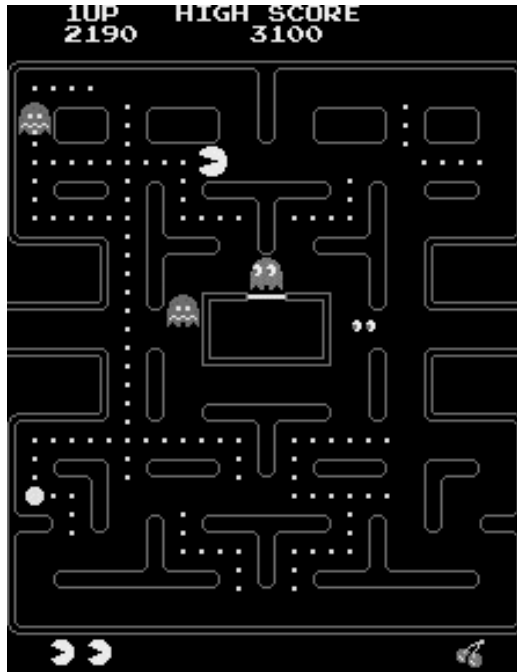


FIGURE 1-1: *Pac-Man*™

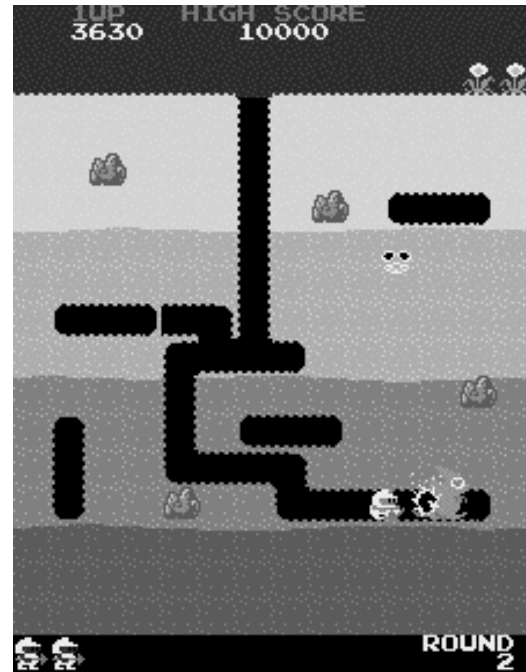


FIGURE 1-2: *Dig Dug*™

Maze/chase games are also unique among arcade games in that they don't usually require very elaborate or sophisticated graphics and animation. Rather, the graphics in these games tend to be more on the simplistic side as these games usually emphasize playability over presentation. In addition, maze/chase games are relatively easy to develop. This makes this game category a perennial favorite with game developers of all levels.

Pong Games

Pong-style arcade games, also occasionally referred to as “bat and ball” games, are among the earliest arcade games developed. They can trace their lineage all the way back to the early 1970s with the advent of the classic *Pong* video game.

All Pong games essentially consist of one or more players manipulating an on-screen paddle device to hit an on-screen ball. In the most basic forms of this sub-genre, the object of the game is to maneuver the on-screen ball past the other

player in order to score points. In the more complex examples, the ball is used merely as a device to destroy other game objects such as walls or even creatures. Technically speaking, the Pong arcade sub-genre also encompasses pinball games as well since these games also feature balls that are manipulated by paddles (flippers) to score points, etc.

The action in most Pong-style games usually occurs on static, non-scrolling playfields. However, they often contain many different levels, each with varying degrees of difficulty and challenge.

Pong Sub-Genre Examples:

- *Pong* (basic)
- *Arkanoid* (advanced)

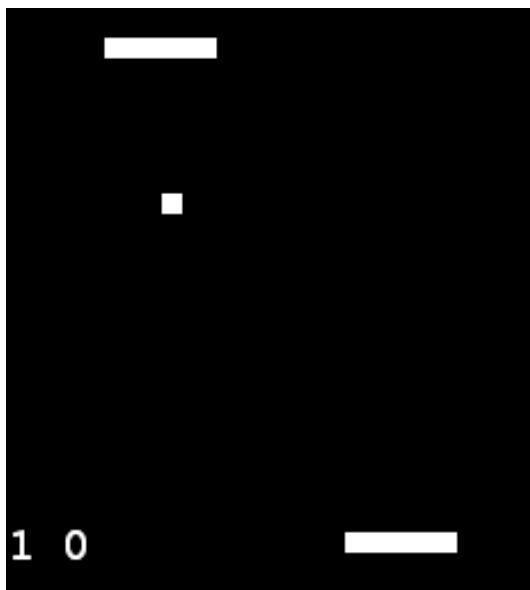


FIGURE 1-3: *Pong*™

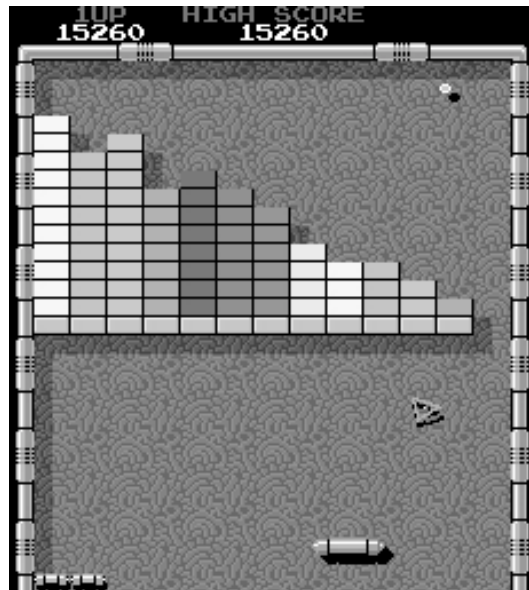


FIGURE 1-4: *Arkanoid*™

The general simplicity of Pong games makes them a favorite among programmers and designers alike, as they are easy to develop. However, don't let this fool you. Some very sophisticated variations of Pong games such as *Arkanoid* have been developed over the years.

NOTE: The original version of *Breakout*, perhaps one of the best implementations ever of the Pong concept, was actually developed in 1974 by none other than Steve Wozniak and Steve Jobs, the founders of Apple Computer. At the time, both of them were engineers at Atari.

Shooters

Arcade game shooters, or “shoot-em-ups” as they’re commonly called, started to appear not long after the first Pong games and remained a dominant force in arcade games from the mid-1980s through the early 1990s.

Shooters are perhaps the broadest of all of the arcade game sub-genres as there have been so many variations developed over the years. Despite this, all shooters share a common theme: one or more players control an on-screen character or object that moves across the screen. This object acts as an aggressor or defender against a horde of on-screen opponents. The goals of the shooter are typically solved through violent action that involves blasting away adversaries before they destroy the player-controlled character. Of all the arcade game sub-genres mentioned here, shooters are the most likely to have no central objective. Rather, the player simply shoots and destroys other on-screen objects for the sake of doing so or simply to score points. As such, shooters tend to emphasize one’s coordination and reflexes over cognitive ability. As with Pong games, there are huge differences in how this activity is implemented.

Shooters also come in two main flavors: *static* and *scrolling*.

Static shooters are limited to the player moving within a fixed area of the screen and firing at an aggressor. Scrolling shooters are offshoots of the static shooter sub-genre. However, unlike static shooters, they free the player from the constraint of moving within a fixed operational area by providing the ability to scroll the playfield in one or more directions. Most scrolling shooters feature two- or four-way screen scrolling which enables the game to feature larger, more sophisticated on-screen objects and game levels.

Shooters, as a general rule, always feature multiple game levels. In this context, these levels are often referred to as “waves.”

Shooter Sub-Genre Examples:

- *Berserk* (static)
- *1943* (scrolling)



FIGURE 1-5: Berserk™



FIGURE 1-6: 1943™

Just like their themes and objectives, shooters vary wildly in terms of how difficult they are to program and design. This is because each shooter implementation imposes different technical challenges and restrictions on the developer. In addition, most developers need to contend with user expectations. While it takes only a few, simple objects to create a basic but functional shooter, most users now expect shooters to feature very complex and detailed game objects which require more time, effort, and skill to create.

Puzzlers

Puzzlers are just what the name implies—arcade-style games that rely on puzzles to further their plot. While this sub-genre was never as popular as maze/chase and shooter games, it really came into its own on home computers during the late 1980s, as it was able to take advantage of a computer's superior "thinking" ability.

Unlike the other arcade game sub-genres mentioned here, puzzlers don't necessarily rely on fast reflexes to play or enjoy. They certainly can, but usually they tend to stress clear, coherent thought over fast action in order to accomplish the various objectives outlined by the game. This being said, puzzlers work a bit differently than most arcade-style games. Instead of having the player maneuver or shoot his way to the goals, puzzlers emphasize solving a variety of puzzles or problems to accomplish the task at hand. So, in effect, puzzlers are actually learning tools in addition to just being plain fun.

Puzzlers, with very few exceptions, tend to use only one game playfield. However, they tend to make extensive use of multiple game levels, perhaps as much, if not more than the other sub-genres described here, in order to keep them interesting.

Puzzler Sub-Genre Example:

■ *Tetris*



FIGURE 1-7: *Tetris*™

In terms of graphics design, puzzlers sit snugly in the middle of the arcade game graphics “difficulty” spectrum. Their graphics aren’t as sophisticated as those featured in shooters but often require more detail than those found in either Pong or maze/chase games. This is probably due to the fact that they need to rely on better visual presentation to convey the ideas and actions required by their puzzles.

NOTE: Puzzlers are chameleons of the arcade game space. They can essentially take on the look and feel of any genre described here and still be considered a puzzler because of their emphasis on thought and strategy rather than hand-eye coordination.

Platformers

Platformers have been around since the earliest days of the arcade games but only really came into their own during the late 1980s with the advent of 16-bit home computers and home video game systems. Since then, platformers have become almost synonymous with the term arcade game.

All platformers share a common plot: the player manipulates an on-screen character, which must overcome a variety of challenges to attain points and achieve a predetermined goal. In addition, all platformers rely on common game elements such as platforms (hence the genre name), bonus objects, and a rich assortment of obstacles and adversaries. This commonality serves to make playing platformers an intuitive process. The logic being that once you've played one, well, you can play them all.

Like shooters, platformers come in two categories: *static* and *scrolling*.

In static platformers, all of the action occurs within a single game playfield that doesn't scroll. However, they make up for this through the extensive use of multiple game levels to challenge the player.

Scrolling platformers, as their name implies, make extensive use of screen scrolling effects. Almost all scrolling platformers scroll their screens left to right; however, quite a few actually support multi-directional scrolling that goes from left to right, right to left, bottom to top, and top to bottom. By their nature, scrolling platformers also rely quite heavily on multiple game levels, which are called "worlds" in platformer parlance.

Platformer Sub-Genre Examples:

- *Burger Time* (static)
- *Gods* (scrolling)

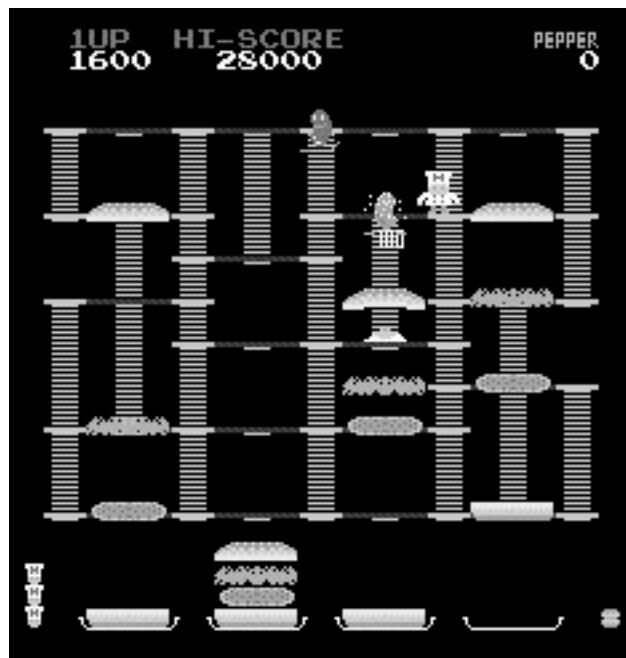
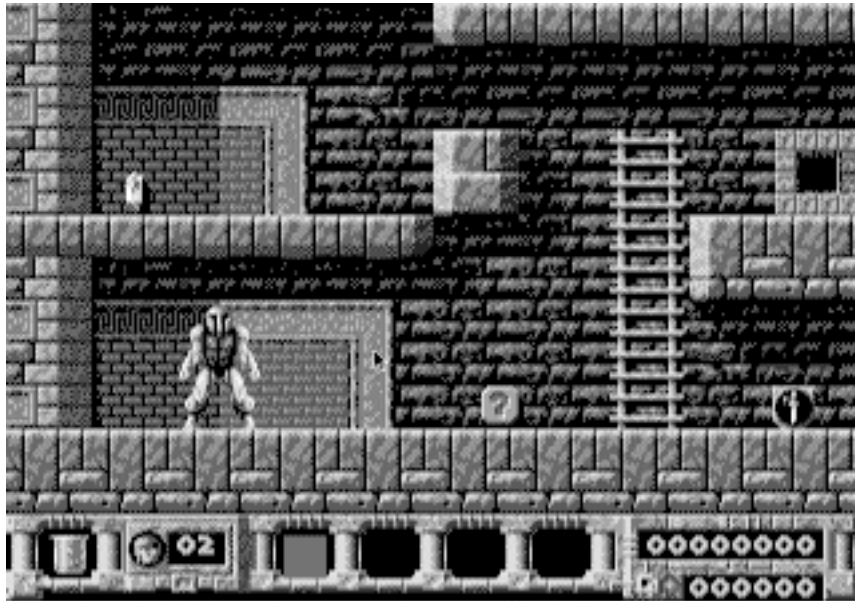


FIGURE 1-8: *Burger Time*™

FIGURE 1-9: *Gods*™

Of the arcade game sub-genres mentioned here, platformers are far and away the most difficult to program and design. Why? This is simply due to the fact that gaming technology has advanced to the point where such games have become very sophisticated. Over time, platformers have developed very rich plots and therefore often require highly detailed and emotive screen characters to enhance their appeal to the player. As a result, more precise and time-consuming artwork needs to be created in order to make such games a success.

This Book and Arcade Games

In order to help you practice what is preached, this book examines how to create one of these arcade game genres in detail: a maze/chase game.

Games of this type are excellent learning tools due to their use of vivid color, simple artwork, and relatively easy-to-create animation. Once you master designing the artwork and animation for this genre, you will have the basic knowledge you need to tackle virtually any arcade game project, regardless of its size, theme, style, or complexity.

Computer Arcade Game Platforms

Now that you have an introduction to arcade games and the different arcade game genres that exist, you should know what *platforms*, or systems, they can run on.

There are many computer arcade platforms available but only a few of them are actually viable options these days. These platforms are:

- DOS
- Windows®
- Macintosh™
- Linux
- Java™
- Video game consoles

DOS

DOS (which includes MS-DOS , PC-DOS , and 100% clones such as DR-DOS) used to be the dominant platform for arcade games running on personal computers from the mid-1980s up until the mid-1990s. However, its days as the premier arcade game platform are fading fast. Although a number of hobbyists and small publishers still make games for DOS, very few commercial programmers actually do. This is mainly due to the increasing influence of Windows in game development circles and Microsoft's declining support for the DOS platform as a whole.

DOS is a 16-bit operating system. This makes it slower in many computing tasks compared to today's modern 32-bit (and soon 64-bit) operating systems. Despite this, DOS still enjoys healthy support from game developers and gaming enthusiasts alike. For one thing, DOS's ability to access the PC's graphics hardware directly gives arcade games the speed and performance that they require for fast action and smooth animation. Second, there's a tremendous wealth of DOS-related game development tools and reference materials floating around. In fact, some of the best arcade game development tools and graphics packages are completely DOS based. Third, DOS is relatively simple to program when compared to other platforms such as Windows. This makes it a good choice for beginners interested in learning how to design, program, and create artwork for arcade games. Finally, DOS is also backwardly compatible with the tens of millions of Windows 3.1, 95, and 98 systems installed around the world, ensuring that there will be an audience for DOS games for some time to come.

Windows

Microsoft's Windows operating system is by far the most dominant computing platform at this time. It's also the current "gold standard" of arcade game platforms. The vast majority of today's game releases are made specifically for the Windows platform. In addition to running over a hundred million machines worldwide, the most recent implementations of Windows utilize DirectX technology,

which makes high-performance arcade gaming experiences finally possible on that platform.

There are several variations of Windows that exist, including:

- Windows 3.1
- Windows 95
- Windows 98
- Windows NT
- Windows 2000

Each version addresses different market segments and offers different features.

Windows 3.1 is an older, 16-bit version of Windows that's really little more than a fancy GUI (graphical user interface) shell that runs over a DOS core. Yet, despite its lack of technical sophistication, Windows 3.1 helped make Windows a popular operating system with consumers around the world. Even so, Windows 3.1 never really caught on as an arcade game platform due to its relatively poor graphics performance. A fair number of people still use Windows 3.1, but like DOS, its user base is shrinking rapidly.

Windows 95 was the long-awaited, 32-bit rewrite of Windows 3.1 that was released in 1995. It successfully married the Windows interface with the power and performance demanded by modern arcade games. Windows 95 is by far the most popular version of Windows and virtually all arcade games and game development tools are made to run under it.

Windows 98 was released in 1998 as an enhancement to Windows 95. It improved on Windows 95's gaming features and added integrated DirectX support, which makes for even better arcade game performance.

Windows NT was developed in parallel with Windows 3.1 but was designed from the start as a 32-bit, business-grade operating system. After years of following a different development path, Microsoft finally gave NT a Windows 95-like interface and repackaged it as Windows NT 4.0. NT 4.0 was the first version of that operating system to appeal to both consumers and businesses. Although NT looks and acts like the other versions of Windows, it's different enough internally to ensure that not all Windows games will run on it.

Windows 2000 is the new kid on the Windows block. At the time of this writing, it has just been released. Despite its interesting name, it's basically just an enhanced version of Windows NT with a few additional features and enhancements, particularly in the area of multimedia. Although Windows 2000 is specifically targeted to business users, there's little doubt that it will run its share of Windows-based arcade games as well.

If you want to develop games for a living or create graphics for them, you'll probably do it on a Windows-based machine. Virtually all of the latest graphics and game

development tools are available for the Windows platform and that's not likely to change in the foreseeable future.

Macintosh

First introduced in 1984, the Macintosh changed the way we interacted with computers by allowing us to perform routine operations with windows, icons, and a click of the mouse. Since that time, there have been many permutations of the Macintosh produced and it developed an incredibly loyal and passionate following among its users.

For a time, particularly during the late 1980s, the Macintosh was actually a very popular gaming platform. However, as Apple's fortunes changed during the early to mid-1990s, the Macintosh's market share dropped significantly and game developers abandoned the platform in droves. However, with Apple's recent resurgence, this downward trend has finally reversed and the Macintosh is once again becoming a viable arcade gaming platform. Even so, the Macintosh pales in comparison to Windows in terms of the number of installed machines, the selection of development tools, available hardware extras, and games being released. This being said, you can still develop some impressive games and game graphics on the Macintosh platform, but you'll have many more options and alternatives available to you on the Windows platform.

Linux

Linux is a free, UNIX variant that has become an increasingly popular alternative to Windows and the Macintosh operating systems due to its low cost, superior performance, and legendary reliability. As one of the fastest growing platforms in the marketplace, it's not surprising that there's been a flurry of recent Linux-oriented game development activity. In fact, a number of popular Windows and Macintosh games have already been ported over to the Linux platform. If the pace of innovation and development continues, there is little doubt that Linux will become an important arcade game platform capable of giving any system a run for its money.

Java

Unlike the other platforms mentioned here, Java isn't really an operating system or hardware system (although Java versions of both do exist) per se, but rather a programming language developed by Sun Microsystems. Programs, once written in Java, can theoretically run on any Java-enabled system in a consistent manner, including arcade games.

There are three things that make Java an important arcade game platform: a large audience, strong graphics support, and universal compatibility. Java enjoys an extremely large installed user base. Essentially, anyone with a modern Web browser can run and play Java-based games. This ensures developers the widest possible audience and provides them with plenty of incentive to develop games. In addition, recent incarnations of Java provide support for a whole slew of graphics features that make it well suited as a game platform. Finally, as Java can run on almost any computer system or device, it's possible to play the same game whether you're using a Windows, Macintosh, or UNIX system.

The only limitation that Java faces as a gaming platform is slow performance. At this time, Java's speed still doesn't match that of traditional computer programming languages such as C++. However, Java is more than capable of providing most types of arcade games with acceptable performance. And, as time goes by, its performance will only improve. When this finally happens, Java will be the arcade game platform to watch.

Video Game Consoles

Video game consoles have been around since the late 1970s with the introduction of the first home versions of *Pong*. They became entrenched in consumer consciousness during the early 1980s when home video consoles like the Atari 2600, Intellivision, and Colecovision came on to the scene. Then, once the arcade game industry crashed in 1983, they vanished almost as quickly as they came. It wasn't until the late 1980s with the introduction of a new generation of home video game consoles by companies such as Sega and Nintendo that they once again captivated arcade game players everywhere.

Currently, there are several video game console models that stand out as popular arcade game platforms. These include:

- Nintendo Gameboy
- Sega Genesis
- Super Nintendo
- Sony Playstation
- Nintendo 64
- Sega Dreamcast

The Nintendo Gameboy is an 8-bit, hand-held gaming system. Many of its games mimic the earlier Nintendo Entertainment System in terms of look, feel, and performance. This platform is well suited for scrolling platform games and puzzlers but little else due to its small screen size and relatively puny processing power.

The Sega Genesis is a 16-bit video game system that was state of the art when it was introduced back in 1989. Although it's somewhat dated compared to today's

modern systems, it virtually redefined the arcade game platformer genre with the release of titles such as *Sonic the Hedgehog*. This platform is well suited for all types of arcade games from shooters to complex, scrolling platformers.

The Super Nintendo is a 16-bit video game system in the same vein as the earlier Sega Genesis. Its main claim to fame was an innovative graphics subsystem that allowed its games to feature some very impressive color and special object rotation effects. Like the Genesis before it, this platform is powerful enough to handle the most demanding arcade game.

Sony's Playstation was the most successful of the 32-bit video game consoles developed. It's also the most popular gaming-dedicated gaming platform currently around and boasts an installed base of tens of millions of units. Its powerful graphics capabilities allow it to run some of the most sophisticated arcade games ever developed.

The Nintendo 64 was Nintendo's third-generation video game console. A 64-bit system, it features sophisticated, custom graphics hardware developed by Silicon Graphics that enables it to produce extremely vivid graphics and animation. Like the Playstation, it too can handle any arcade game with ease.

Lastly, there's Sega's Dreamcast. This is the first 128-bit video game console on the block. It has all of the features and capabilities needed to take arcade gaming to the next level.

As you can probably imagine, the video game console market is huge. There are literally millions of installed systems from every manufacturer and of every variety in homes across the world. As such, video game consoles are an extremely viable arcade game platform. There's no shortage of software for them and they're likely to remain popular for some time to come.

Table 1-1 provides a summary of the pros and cons of each platform we've just discussed.

TABLE 1-1: Summary of Arcade Game Platforms

Platform	Pros	Cons
DOS	<ul style="list-style-type: none"> ■ Offers excellent screen performance which makes for fast games ■ Has a large installed user base ■ Has many good development tools available for it ■ Easy to develop on, which makes it good for beginners. 	<ul style="list-style-type: none"> ■ Based on archaic technology that's really starting to show its age ■ No longer Microsoft's flagship product, thus support for it is rapidly waning

Windows	<ul style="list-style-type: none">■ Offers very good screen performance, which makes for fast games■ Enjoys the largest installed user base of any arcade game platform■ An accepted industry standard arcade gaming platform■ Lots of development tools available for it■ Supports a wide array of machines and hardware	<ul style="list-style-type: none">■ Somewhat difficult to develop for
Macintosh	<ul style="list-style-type: none">■ Offers good screen performance for most types of arcade games■ Has an extremely loyal and productive user base	<ul style="list-style-type: none">■ Limited development tools available compared to Windows and DOS■ Somewhat difficult to develop for and not really suitable for beginners■ Has a much smaller user base compared to Windows
Linux	<ul style="list-style-type: none">■ Offers good screen performance for fast games■ Has an extremely loyal and productive user base■ Enjoys a rapidly growing user base	<ul style="list-style-type: none">■ Limited number of development tools available for it■ Somewhat difficult to develop for and not really suitable for beginners
Java	<ul style="list-style-type: none">■ Enjoys a very large installed user base■ Lots of development tools are available for it■ Offers developers a “write once, run many” approach to game development■ Supports a wide array of systems and platforms■ Flexible and extensible	<ul style="list-style-type: none">■ Somewhat difficult to develop for and not really suitable for beginners■ Relatively slow screen performance currently limits the types of games it can run
Video game consoles	<ul style="list-style-type: none">■ Their excellent screen performance makes for fast games■ Enjoys a very large installed user base■ An accepted industry standard arcade gaming platform	<ul style="list-style-type: none">■ Limited development tools available■ Development is prohibitively expensive for most users due to licensing costs■ Somewhat difficult to develop for and not really suitable for beginners