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Review

The History of Computing in Iran (Persia)—Since the Achaemenid Empire

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Abstract: Persia was the early name for the territory that is currently recognized as Iran. Iran's proud history starts with the Achaemenid Empire, which began in the 6th century BCE (c. 550). The Iranians provided numerous innovative ideas in breakthroughs and technologies that are often taken for granted today or whose origins are mostly unknown from the Achaemenid Empire's early days. To recognize the history of computing systems in Iran, we must pay attention to everything that can perform computing. Because of Iran's historical position in the ancient ages, studying the history of computing in this country is an exciting subject. The history of computing in Iran started very far from the digital systems of the 20th millennium. The Achaemenid Empire can be mentioned as the first recorded sign of using computing systems in Persia. The history of computing in Iran started with the invention of mathematical theories and methods for performing simple calculations. This paper also attempts to shed light on Persia's computing heritage elements, dating back to 550 BC. We look at both the ancient and current periods of computing. In the ancient section, we will go through the history of computing in the Achaemenid Empire, followed by a description of the tools used for calculations. Additionally, the transition to the Internet era, the formation of a computer-related educational system, the evolution of data networks, the growth of the software and hardware industry, cloud computing, and the Internet of Things (IoT) are all discussed in the modern section. We highlighted the findings in each period that involve vital sparks of computing evolution, such as the gradual growth of computing in Persia from its early stages to the present. The findings indicate that the development of computing and related technologies has been rapidly accelerating recently.

Keywords: history; computing; Iran; Achaemenid Empire; Persia

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1. Introduction

The history of mathematics is concerned with the origins of mathematical discoveries as well as the mathematical methods and notation of the past [1]. Before the modern era and the global transmission of information, written evidence of new mathematical breakthroughs was only found in a few places [2]. Ancient peoples used their fingers, notches in sticks, knotted ropes, and stones to count and make primitive computations. Most early societies developed some version of a counting board or abacus to accomplish arithmetic. So, numerous compelling reasons exist to investigate the history of computing and mathematics [3]. It assists researchers in developing a deeper grasp of previously learned mathematics by demonstrating how it evolved over time and in diverse locations [4]. Persia is well known as among the world's computing hotspots. Iran is the modern name for the bulk of the territory once known as Persia [5]. The Achaemenid Empire, which began in the 6th century BCE, is the foundation of Iran's illustrious history. The Iranians

contributed various achievements and technology that are frequently taken for granted now or whose roots are mostly forgotten in the early days of the Achaemenid Empire [5].

The depiction of numbers is inextricably linked to digital computing. However, as previously said, there were mathematical conceptions that served the goals of a civilization long before abstractions such as the number existed [6]. Mathematics is prized in today's culture. It provides a foundation for understanding economics. It is important in the physical sciences, technology, business, financial services, and IT sectors. It is also becoming increasingly important in biology, medicine, and many social sciences [7]. Mathematics offers a means for organizing and structuring knowledge, allowing scientists and engineers to develop systematic, repeatable, and transmittable knowledge when applied to technology. So, in current scientific research, technology and mathematics are used significantly for everything from data collection to data analysis to data quality determination. This enhances the quality of the science being done while accelerating its completion. The modern age of mathematics was distinguished by the systematic and thorough synthesis of mathematical knowledge. It is notable for discovering profound structural phenomena and the generalization, unification, and synthesis of all mathematics [8].

To understand the history of computing systems in Iran, we must look at everything that can conduct computation. Because of Iran's old past, understanding this nation's computing history is a fascinating subject. Iran's computational history began well before the digital systems of the twentieth millennium. The Achaemenid Empire is credited with being the earliest known use of computing technologies in Persia. In Iran, the history of computation began with developing mathematical ideas and methods for simple computations. This research aims to illuminate Persia's computing heritage, dating back to 550 BC. We examine the history of computing from the beginning to the present. We will go into the history of computing in the Achaemenid Empire in the ancient portion, followed by discussing the equipment used for computations. The contemporary segment also covers the transition to the Internet age, the establishment of a computer-related educational system, the expansion of data networks, the rise of the software and hardware business, cloud computing, and the Internet of Things (IoT). We emphasized the discoveries each time that feature important sparks of computing progress, such as Persia's steady rise of computing from its early beginnings to the present. According to the findings, the rise of computers and related technologies has recently accelerated rapidly. The detailed contributions of this paper can be summarized as follows:

- Examining the evolution of computing from its inception to the present in Iran;
- Presenting a history of computing in the Achaemenid Empire followed by a study of the computing equipment utilized;
- Covering the industrialization of society, the construction of a computer-related educational system, the expansion of data networks, and the emergence of new computing platforms in Iran.

The rest of this paper is structured in the following manner. Section 2 deals with the ancient age. Section 3 describes the modern age. Section 4 presents the conclusion and future scope.

2. Ancient Age

Persia was the place where the first empire in the world was formed. After the Medes, the Achaemenids were the second official empire in Persia. The Achaemenid Empire (550–330 BCE) was the world's largest empire. As a result, discussing computing systems in Iran must begin with examining the first signs of computing during the Achaemenid Empire. Figure 1 depicts a timeline of some significant events extracted from our profound studies in the history of computing in Persia (Iran). This article follows this figure to illustrate the history of computing in Iran. In this section, some ancient tools that were used for performing primary computing are discussed. The rest of this paper goes into the 5 millennia of the computing history of Persia and its pivotal events [9].

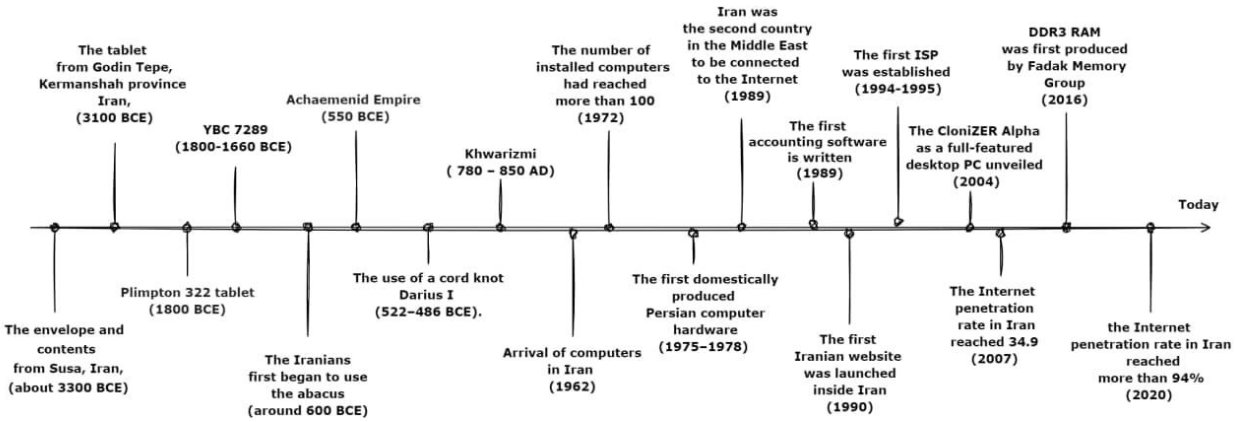

Figure 1. A timeline of significant computing events in Persia (Iran) from 3200 BCE until 2020 (not-scaled).

2.1. Mesopotamian Accounting Tokens

Archaeological digs have uncovered thousands of tiny clay cones dating back to 7500 BCE. These cones and objects, referred to as "tokens", have specific shapes and patterns indicating a designated purpose, but their goals remained a mystery for a long time. Denise Schmandt-Besserat, an art historian who began examining these pieces in 1969, solved the enigma. Her most important finding was that ancient people used the tokens as counters. These tokens' usage goes back thousands of years, from simply shaped tokens to more complex bearing patterns. Each shape represented a specific quantity of a particular product. For example, a cone was used to measure a small amount of grain, and a sphere was used to measure a large amount of grain. Using different counters' shapes to count various products is evidence of counting, meaning each category of items was counted with special enumerations. The counters were pressed into the clay to record economic transactions. A hollow spherical orb formed of clay was employed as a receptacle for tokens in Iran. After the tokens had been placed, the sphere was sealed and imprinted with a message on the outside [10].

The exterior impression was formed with a cylinder seal, and sometimes a representation of the tokens within was added for good measure. It gave caravan riders a safe way to transport records of items delivered or received. To make the quantity and shapes of tokens included evident, they were occasionally housed in clay envelopes with their impressions formed on the envelope's surface. The envelope and contents from Susa, Iran, in approximately 3300 BCE, are kept in the Louvre museum, containing one large cone and seven small ones. In this envelope, each lenticular disc stood for "a flock". The large cone represented a considerable grain measure, and the small ones were designated to measure a small amount of grain. As a result, it is regarded as the first storage in history.

In addition, a tablet from Godin Tepe (approximately 3100 BCE) was discovered in Kermanshah province (an archaeological site in western Iran) and is now housed at the Royal Ontario Museum in Toronto. The wedges represented units, while the circular impressions represented tens. This tablet was a record of 33 jars of oil, as depicted by the engraved figure to the right. The six impressions on this tablet symbolize abstract numbers and a specific object's carved figure [11].

2.2. Babylonian Mathematics

Babylonian mathematics denotes the mathematics developed by the people of Mesopotamia from the sixth millennium BCE to 539 BCE. Mesopotamia corresponds to parts of Iraq, Kuwait, northern Saudi Arabia, eastern Syria, southeastern Turkey, and western Iran. Babylonian mathematics is based on a sexagesimal number system in which sixty is the base. Plimpton 322 is among Babylonian's most sophisticated scientific cre-

ations, with 15 rows of arithmetically difficult Pythagorean triples. It is the world's first trigonometric table. Figure 2 shows the Plimpton 322 [12].

Additionally, the YBC 7289 is another tablet in this age and contains an accurate sexagesimal approximation to the square root of 2. The value is derived from the uppermost horizontal inscription and is the highest known computational accuracy achieved anywhere in ancient times. Figure 3 shows the YBC-7289 tablet and a transcription of the mathematical cuneiform text. The sexagesimal number 1, 24, 51, and 10 is equivalent to $1+\frac{24}{60}+\frac{51}{60^2}+\frac{10}{60^3}$, which is a good estimate of the number $\sqrt{2}$. In the tablet, the 30 means $\frac{30}{60}=\frac{1}{2}$. The other numbers on the tablet represent the length of the side. The numbers are 0, 42, 25, $35 = 0+\frac{42}{60}+\frac{25}{60^2}+\frac{35}{60^3} = 0.70710648 \approx \frac{\sqrt{2}}{2}$ [13].

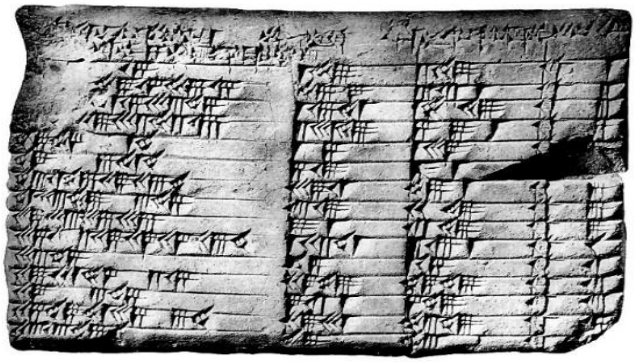

Figure 2. Plimpton 322 is a Babylonian clay tablet with an illustration of Babylonian mathematics [14].

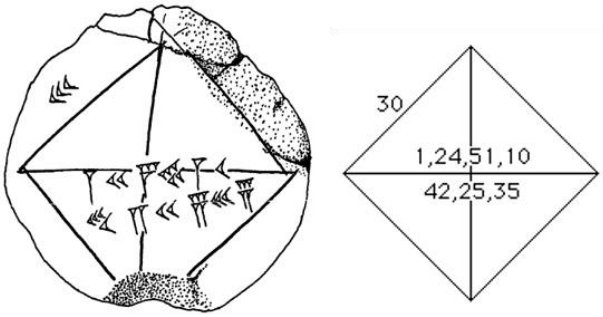

Figure 3. Tablet YBC-7289 (**left**) and a transcription of the mathematical cuneiform text (**right**) [15].

In addition, tablet YBC 7290 demonstrates how to find the area of a trapezium by multiplying the averages of the bases and sides [16]. Furthermore, tablet YBC 7290 shows how to multiply the averages of the bases and sides to obtain the area of a trapezium [15]. The date of all of these tablets is unknown, but it is generally agreed that they came back between 1800 and 1600 BCE.

2.3. Tally Stick

Tally sticks were ancient memory-assistance devices that recorded and documented numbers, quantities, or messages. They first appeared as animal bones carved with notches during the Late Stone Age (between 50,000 and 12,000 years ago). A famous example of using animal bones for producing tally sticks is the Ishango Bone. Ishango Bone is the first evidence of a calculator in the world. The bone is approximately 10 cm long and contains a series of notches to count. Figure 4 shows the tally stick with the Ishango bone and related notches and numbers. The arrangement of the notches could even imply a more advanced mathematical understanding, such as decimal or prime numbers. The split tally and the single tally are the two most common types of tally sticks [17].

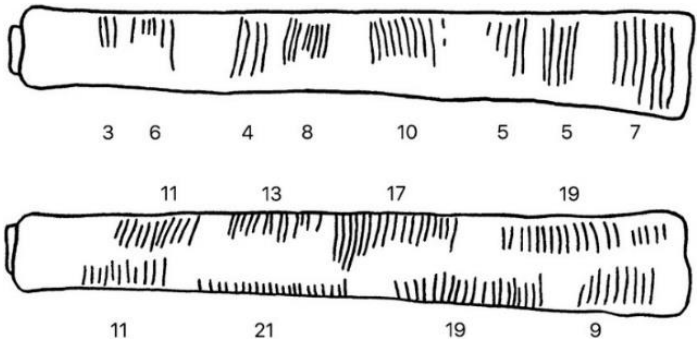

Figure 4. The tally stick with Ishango bone and related numbers [18].

- ***Split tally***

The split tally was a technique that became common in medieval Europe for accounting. A stick was split lengthwise after being marked with a series of notches. As a result, the two halves of the marked stick record identical notches, and each party to the transaction receives one-half of the stick as proof. The longer portion was known as "stock". It was delivered to the person who had loaned funds to the receiver. Foil was the shorter part of the stick given to the party receiving the goods. With this method, each party had a transaction record that could be traced back to them. Because of the natural flaws in the surfaces of the tallies where they were split, only the original two pieces would fit back together completely, proving that they were identical halves of the same transaction. If one party attempted to unilaterally change the value of his side of the tally stick by adding more notches, the opposing party's tally stick would show the lack of such notches. In medieval courts, the split tally was considered legal proof [19].

- ***Single tally***

The single tally stick was an elongated piece of bone, ivory, wood, or stone marked with a notch system to indicate the payment amount. Additionally, a cord knot is the simplest kind of single tally stick. One knot in the string has the same meaning as one notch in the tally stick. Counting with knotted strings has been discovered in many places around the world. As with the tally sticks, the knotted number strings later evolved into a slightly more sophisticated mechanism. Combinations and numerous sorts of knots replaced the simple single knot. The relative placements of the knots on the string came to signify the order of magnitude of the number, and different types of knots conveyed varied values. Taxes, salaries, calculations, and even the weights of agricultural production could all be recorded using knotted strings. These knots were knotted at the ends of the cords used to close the flour bags.

In addition, Figure 5 depicts a knot example with numbers ranging from one to nine. Figure 6 shows the sample knots and related computing. The knots were tied in the cords to represent units of ten and multiples of ten according to where they were placed. The distance from the knot to the top shows the order and value. Further, the use of a cord knot in Persia has returned to the Achaemenid Empire. The ancient Greek historian Herodotus (an ancient Greek historian born in Halicarnassus in the Persian Empire, living from 485 to 425 BCE) reported the use of the cord knot in Persia during the period of Darius I (522–486 BCE). The third King of Kings in the Achaemenid Empire was Darius I. He was among the Achaemenid dynasty's strongest monarchs, known for his administrative prowess and massive construction projects.

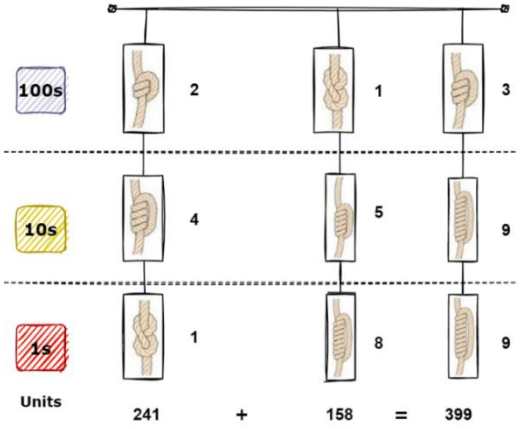

Figure 5. A knots example of numbers from one to nine.

Darius I, after crossing the River Ister to attack the Scythians, accepted the advice of Coes (Coes was a Greek military commander of Mytilene and supported King Darius Hystaspes of Persia in his Scythian expedition (c. 513 BC) as commander of the Mytilenaeans) to leave a guard at the bridge. So, he tied sixty knots and called the despots of the Ionians and said: *"Ionians, I renounce the opinion which I before declared concerning the bridge; do you now take this thong and do as I command you. Begin to reckon from the day you shall see me march away against and if the days marked by the knots have all passed and I have not returned ere then, take ships for your homes"*. Knot calendars were presumably an ancient device in Darius's day. After more than two thousand years, they are still being used in many places worldwide [20].

2.4. Abacus

An abacus is a computing and calculating device that has been used since antiquity and is still in use today. It was used for millennia before the written Arabic numeral system was adopted in the ancient Near East, Europe, China, and Russia. The abacus's exact origin is a question. It is made up of rows of movable beads that represent numbers. The beads are moved to operate, involving a second number or a square or cubic root more rarely. Iranians first used the abacus during the Achaemenid Empire, circa 600 BC. Scholars focused on exchanging knowledge and discoveries with the countries around them during the Parthian, Sassanian, and Iranian empires—India, China, and the Roman Empire, when it is thought to have spread to other countries [21].

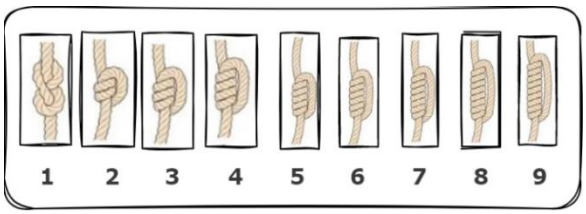

Figure 6. Sample nodes and related calculations where numbers are added as units and tens and hundreds (adopted from [22]).

2.5. Algebra and Arithmetic

The "algebra" comes from the title of the early 9th-century book "The Science of Restoring and Balancing" by the Persian mathematician and astronomer Al-Khwarizmi (A.D. 780–850). Transferring a term from one side of an equation to the other was referred to as Al-Jabr. During the 15th century, the word finally reached the English language, shortened to algebra or algebra in Latin. Algebra is now employed in computer science to create algorithms and software for manipulating mathematical objects. Figure 7 shows a page from his Algebra book.

Figure 7. A page from al-Khwarizmi's "Algebra" [22].

Another most influential work of Al-Khwarizmi's was on arithmetic, which was lost in the original Arabic but survived in Latin translations. He described algorithms that could be performed on a dust board using decimal numbers (Hindu–Arabic numerals). He introduced the decimal number system to the Western world in the 12th century as a result. Calculations were done on a board covered with a thin layer of dust, on which figures could be written with a stylus and erased and replaced as needed. Al-Khwarizmi's algorithms were employed for almost three centuries until they were supplanted by Al-Uqlidisi's algorithms, which could be done with a pen and paper. To solve linear and quadratic equations, Al-Khwarizmi used a method that first reduced the equation to among six standard forms [23].

3. Modern Age

In the last 70 years, the way of communication, computing, working, and activities has changed dramatically because of the approaches and improvements of computers [24]. Iran has also been affected by these huge developments. This section discusses the developments of computing systems in Iran in three main parts. The first part deliberates the first evidence of the computer in Iran. Then, the developments of the computing systems in Iran have been discussed. Finally, the current position of the computing system in Iran is explained. Iran's modern computing history can be divided into four distinct periods: (1) Computers were first introduced to Iran in 1962. As a result, the introduction of computers in Iran occurred approximately ten years after introducing computers in developed countries. (2) Computer development, Iran's computer development era began in 1971 and lasted until 1981. This path was followed by a lot of competition to buy hardware, introduce massive software systems, recruit more manpower, and follow rigorous programs based on the country's technological realities. (3) Computer revisit: As a result of the Islamic Revolution, improvements and innovations in computers occurred, and a series of general reviews were conducted until 1980. (4) Technological maturity and growth in Iran: Following the reopening of universities in 1983, the next stage of computer development began, with software and hardware becoming widely available. The Persian language and script processing is among this century's most important works [25].

3.1. The Appearance of Modern Computers in Iran

Iranians started to use computers in activities shortly after they became common in Western countries. In 1962, the first computer from IBM was imported to Iran. The first

imported computers in Iran were mainly IBM 1400 and IBM 1620. These machines were used to process statistical data and various ancillary equipment. Despite their slowness, they were used in government for a long time and were purchased by private institutions. Iran National Oil Company installed the first applicable computer (IBM-1620) at the beginning of 1962 to keep track of oil production. The first computer was administrative and pre-packed with administrative software (box computing). The second and third computers were established in 1963. The Iranian software sector had deep roots in mainframe computers during these years. Because Iranian enterprises primarily served domestic market demands, they were mostly unaware of major software industry advancements [26]. Although the assistant secretary's office for information services in plan and budget organization attempted to manage computer use development, the relevant budget increased radically without increasing productivity.

3.2. The Development of Computers

Iran had more than 100 computers installed by 1972, including two IBM/370 machines. Imports of computers totaled USD 6.5 million in that year. Until 1974, the utilization of computers in Iran was very limited. However, Iran had approximately 600 computers by 1977, with thirty IBM 370s among them. In 1978, over 100 businesses leased mainframe computers and accessories to government and commercial offices. Major Western, generally American, computer corporations such as IBM and Electronic Data Systems produced most of the hardware. The software was also primarily imported from the United States. According to official data, approximately USD 30 million worth of computer equipment was imported in 1978, roughly two-thirds of which came from the United States. This ratio is probably understated, as computers were typically not reported separately but rather as part of larger projects with large budgets for staff, support services, features, supplies, and training. In 1978–1979, for example, the Electronic Data Systems contract to computerize the Persian social-security system cost USD 20.5 million for fourteen months [27]. Computer imports in Iran dropped to 52.3 million in 1979. In both government and private offices, the need for computers has grown. The computer industry, on the other hand, grew again. Rather than renting, most of the new computers were bought. In 1979, the Iran supreme council on information was formed studied governmental computer requirements and applications to plan and support all computer-related activities and study the country's management-information needs.

In the 1980s, the increasing availability of low-cost personal computers and Persian word-processing software fueled a massive increase in the import of computer components assembled in Iran. Payroll records, billing, accounting, banking, personnel records, college examinations, and military applications are all common uses for these computers. Controlling power distribution, scientific calculations, oil drilling and refining, factory production control, computer-aided design and manufacturing, and databases are all examples of industrial applications. The sciences and higher education ministry is computerizing university library catalogs. Computer applications in the humanities have included computerized concordances and various Persian texts produced by the linguistic academy [28].

3.3. Persian Computer

Iran's computer manufacturing industries produced the first domestically produced Persian computer hardware in 1975–1978, which consisted of terminals. Mini- and microcomputers were also built in laboratories at several technical colleges and industrial training institutes. The M-1 minicomputer, for example, was built at the college of computer programming and application in 1980. The Institute for Research first introduced a microcomputer in Communications in 1984 and was later mass produced. Some electronics companies are mass-producing microcomputers and peripheral devices [9].

The incompatibility of the Iranian alphabet with hardware and software designed for the Roman alphabet was a major driving force behind the development of the Iranian

computer industry. Special software is required to display and process Persian text on a terminal. For mainframe applications, Persian software had already begun to be used. The first microcomputer software was created in the West, primarily in the United States, for business and academic purposes and was then exported to or copied in Iran. Persian-text software had been developed and was being sold in Iran by 1991 [29].

3.4. The Growth of Local Computing Systems

The mainframe sector remained stagnant until 1985, when the personal computer arrived in Iran, spawning a new industry. On the other hand, the industry remained largely isolated from cutting-edge developments in major global information technology centers [30]. The industry is still in its infancy, with few project management skills when it comes to application development. Iran saw gradual attempts to liberalize and open up specific sectors of the economy, particularly Information Communication Technology (ICT), in the late 1990s. Part of the reason for this liberalization and focus on ICT is that the country has realized it needs to diversify its revenue streams away from oil. Iran's economy is based on oil and gas, accounting for more than 80% of the country's export earnings. Second, some other countries have recognized the need to reap some of the benefits of developments in the "network society." The polarization of conservatives and reformists in government due to this liberalization drive has created tension and uncertainty about the government's course [31,32].

3.5. Internet

In 1993, Iran was the second country in the Middle East to be connected to the Internet. In 1989, the Research Center for Theoretical Physics in Iran became the first computer in Iran to be connected to the Internet. The first Iranian website was launched in Iran a year later, in 1990. The Center for Theoretical Physics and Mathematics Research introduced the Internet to Iran, which is now known as the Institute for Research in Fundamental Sciences [33].

3.5.1. First Website and First ISP

In 1992, a small number of universities in Iran, including the Sharif University of Technology and the University of Guilan, used the Center for Theoretical Physics and Mathematics Research and the Unix-to-Unix Copy (UUCP) protocol to link to the Internet and send an e-mail with the rest of the world. The Institute of Basic Sciences is currently the only official source for registering the national "ir" domain. Additionally, the Hamshahri newspaper, which is the first official Iranian newspaper on the web, was published on the Internet. Neda Rayane became the first Internet Service Provider (ISP) after connecting to the Internet through the Canadian satellite Code Vision (Cad Vision). The Islamic Consultative Assembly approved establishing a data communications company under the umbrella of the Iran Telecommunication Company in 1995, giving the company sole responsibility for producing data services in Iran [34].

3.5.2. The Internet Penetration

In the case of the Internet, the first Bitnet network was established in Iran in 1989. In 1993, the public Internet started working. Then, satellite Internet connection with a speed of 128 and then 512 Kbps was provided. In 2004, ISPs started operating in Iran. In 2005, the first comprehensive center for applied services in rural information and communication technology was established. Then, the headquarters for organizing Iranian Internet sites started working. In 2007, the Internet penetration rate in Iran reached approximately 34.9. In 2007, Internet services were provided on mobile phones. In 2012, the first stage of the national Internet started working. The Internet penetration rate in Iran reached more than 94% [35].

3.6. Software

In the accounting area, the first accounting software was written in 1989, which had a four-column trial balance. The size of this free software was approximately 1.09 MB, and it could only be placed on a floppy disk. This software was prevalent for approximately 4 years and was used by various companies, individuals, and organizations. Currently, many kinds of accounting software are released and used in Iran. Later, other individuals and legal entities entered the field of accounting software products and introduced new accounting software to the market under the Disk Operating System (DOS) and Windows operating systems. Since then, many accounting software packages have entered the market, each of which, in turn, has advantages and disadvantages and has gained customers in the labor market. Among all this accounting software, Parmis integrated accounting and financial software entered the market for the first time in 2001. From the very beginning, it was able to gain a good position in the accounting software market among its competitors and respond well to the needs of its users. Currently, numerous local companies are working in this domain by developing mobile, Android, IOS, accounting, financial, human resource management, enterprise resource planning, customer relationship management, and many other types of software and systems [36].

3.7. Hardware

Many companies in Iran now produce or assemble numerous related computer equipment such as chips, motherboards, electronic devices, monitors, printers, smartphones, and power supplies. Some of them are reviewed in this section. The CloniZER Alpha, a full-featured desktop PC with an integrated 15″ diagonal TFT LCD, an Intel Pentium 4 processor, 80 Gig HD, and 512 MB RAM, was unveiled in February 17, 2004, in Tehran. The product gives users the ultimate desktop computing experience, allowing them to access information, communicate, and entertain themselves quickly and easily. It's made to work in offices, kitchens, living rooms, and bedrooms. You could check your e-mails and faxes and watch your favorite TV shows. Although the built-in printer and scanner allow you to print and scan e-mails and faxes. The CloniZER General Self Administration (GSAM) 2007 bundled program has specific features meant to improve your digital life experience in a very short period with a learning curve as simple as you have never seen before. Voice command technology, Text to Speech (TTS) ability, and easy-to-use graphical icons are other features of this system. The CloniZER spell checker was also another service based on this system [37].

3.8. Cloud Computing, IoT, and New Computing Platforms

Cloud computing has little impact on Iran under the present circumstances. Iran's adoption of cloud computing is slower than that of the rest of the world. Iran has a small number of companies providing cloud services. In terms of the state of cloud computing in Iran, even though there are no reliable statistics on the subject, it can be said that, although cloud computing is occasionally used in consumer applications, the technology has not progressed very far in Iran. No proper infrastructure has been developed. However, the country is seeing many data centers installed, and almost every company has moved to one. As a result, there are a lot of infrastructure and data centers, but there is no serious commonality between them, and their use has not been widespread. On the other hand, cloud computing can help create a shared space and prevent currency outflows from the country [38].

In Iran, the growth of IoT startups and creative businesses has become critical. IoT has become a feasible solution to complex problems thanks to the entrance of knowledge-based companies into the supply of cutting-edge technology. The ICT has been active in conducting comprehensive research to implement the infrastructure needed for the IoT. This research institute has conducted training workshops in IoT to broaden basic knowledge. With the launch of the NB-IoT network, MTN-Irancell, the second cell phone operator in Iran, has provided a suitable infrastructure for developing the IoT to Iranian companies.

Iran currently produces a variety of intelligent equipment for a variety of applications. Iranian companies can develop the necessary information and technology for IoT [39]. The development of a wide range of domestic smart equipment has prompted the IoT in Iran to move toward localization and the ability to customize goods and services. Mashhad city is regarded as among the forerunners in advanced technologies. Mashhad, Iran's second-largest city, has begun to take steps to make the city smarter. The implementation of the Mashhad city smart card project (I card) has shown that the citizens and officials of Mashhad are committed to making the city smart. Mashhad's smart facilities and offices have prepared the city to join different intelligence fields. According to many statistics, a total of 155 private companies are involved in the field of IoT, with 63 companies in the area of communications, 50 companies in the provision of services and software, and 42 companies in the fields of hardware, sensors, maintenance, and processing. On the other hand, the companies Favamoj, Sikas, Parsnet, and MagFa can be considered activists in this area [40].

4. Conclusions

Computers and all computing systems have significantly impacted societies and people. This impact is becoming greater and more critical today. Iran is also among the countries that influenced the history of computing. Additionally, recently, Iran has been influenced by a wide range of computing systems. Computing is now an important part of the country's education and economy. The number of companies involved in developing computer software and networking technologies has grown, and they are now more global. Furthermore, a thriving ecosystem has developed around Iran's microelectronics industry. Moreover, the computer engineering departments of many Iranian institutions are listed among the best in the subject. This study studied the history of computing in Iran in two parts: ancient and modern ages. In the ancient age, the influence of Iran (Persia) was more notable. The historical review showed that the first roots of calculation and computing in Iran were back in the Achaemenid Empire (550—330 BCE). After that, many improvements were made in Iran, some of which are mentioned in this paper. The computing systems in Iran are getting great attention now. Total investment in telecommunication infrastructure as a percentage of total revenue is 73.68%, among the top 10 in the world. Recently, many Iranian companies and businesses have been aggressively working on this area. This study will help all researchers in this area better understand the growth of computing in Iran and its current position.

Our main limitation in this article was that many historical records were unavailable for various reasons, such as destruction and lack of availability. Additionally, this article could not use many of the images due to copyright limitations.

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