Preference Analysis of Operating System Using PROMETHEE Method

***Chinnasami Sivaji, M. Ramachandran, Chandrasekar Raja**
REST Labs, Kaveripattinam, Krishnagiri, Tamil Nadu, India.
*Corresponding author Email: chinnasami@restlabs.in

Abstract. The operating system is computer software. User communication between the computer and the operating system takes place with the help of Windows, Linux, and Android, which are examples of operating systems that manage all other applications on a computer boot program. Application programs make limited application requests for services through the program interface using the operating system's API. The ROMETHEE method assumes that the weights of the criteria are already known, and this is a rigorous assumption. Furthermore, with the increase in the number of criteria, the complexity of the problem increases exponentially. We used ROMETHEE for ranking the priority of the ranking system for enrichment estimation. The ROMETHEE method is the most ideal solution for short-distance and alternative solutions, but the comparison of these distances does not consider importance. We evaluated Operating system 1, Operating system 2, Operating system 3, Operating system 4, and Operating system 5 based on memory management, process management, storage management, protection and security, and software features. After analyzing the results, it was found that Operating system 4 obtained the first rank, whereas Operating system 1 had the lowest rank.

1. Introduction

The operating system manages the computer's hardware and software resources, and it is a part of the software that provides general programming for computer programs. The operating system allows all computer programs and other devices, including firmware, to work properly. It performs basic functions such as receiving input from the keyboard, authenticating files on the disk, tracking directories, sending and controlling output to the display screen. The operating system serves as a bridge between the hardware and the application programs on a PC, allowing for better communication between the two. It is the interface between the hardware and the computer user, and it controls devices like printers. The operating system is also the software needed to run application programs and utilities. The conventional PROMETHEE method assumes that the weights of the criteria are already known, which is a strict assumption. Moreover, with an increase in the number of alternatives to be sorted, the number of optional codes to be systematically evaluated grows exponentially. The PROMETHEE and Gaia system allow decision-makers to find the most appropriate alternative for their target, and it helps to understand the problem. It provides a comprehensive and rational framework to create the problem of decision-making, detect clusters of actions, measure and highlight key alternatives and structured contradictions.

2. Operating System

The operating system is the division of a computer installation among several programs that create unpredictable demands on its resources. The designer's primary task is to create resource allocation (or planning) algorithms for a variety of resources. Each project contains a certain amount of local administration data, some procedures and functions to obtain and publish resources called by desired programs. Such a collection of procedures and related data is called a monitor, and the appropriate code can be based on the class code [4]. Compatibility of the Operating System Services with the database management review is done to support the functions. Buffer pool management is included in these services, along with the file system, planning, process management, and communication stoppages [1]. The operating system also interacts with input devices. Even the gate-level interpretation of the microprocessor may not be accurate enough to fully capture reality. Where a person makes a cut-off depends on what level of guarantee one is interested in and where the income will reach the point of decline [2]. The run for this new type of portable computer devices systems from today's operating systems will be different. Our perspective on being and everywhere creating different areas of rich computing will create the ubiquitous computer world and change the way we experience computing [3]. Most multimedia-enabled systems discussed above use one of the methods. Some settings, such as those discussed in the "Planning Experiments" in the sidebar, replace planning with a real-time schedule. These settings are viewed as newer operating systems possible because they are common systems and are not compatible with applications based on the existing process manager, while other systems use the Meat Scheduler [6]. Operating systems are large enough to hold all the programs that fit into the system's memory, but there may be only a very limited number of versions of the operating system, all of which are almost identical, providing much more coherent space, with only a few points that are very closely linked. Therefore, only a few guesses are needed to determine exactly which version of the operating system [9]. The operating system predates the centered 70s and 80s military organizations and many

organizations, such as SELinux, with operating systems like UNIX in the 90s, had ideas for integrated information flow. Dynamic-adjusted security labels data tanning first pointed out that it could leak, suggested standard verification instead, and this then yielded useful results as type-analysis, demonstrating a significant relaxation of decentralized classification and approval idea in operating systems [10]. Operating system behavior can vary significantly in application behavior, so ignoring the elements in such a large implementation has a dramatic effect on the scale. In modern architecture, which takes into account the needs of operating systems, "Traditional Unix" operates the design. But, as mentioned, various new requirements change - in applications create inappropriate definitions [11]. The operating system executes the request generally, and foreign service for any computer call utility programs that are needed. Users cannot determine either. Honestly, most high-level areas of computer service practices are unaware of the network. Within the operation of the operating system, the so-called foreign service requirement is the operating system [13]. The down in describing, one with the attributes we need, giving the impression of a virtual processor, has an overall profound impact on the structure [15]. Memory management controls and integrates memory is the process. The operating system (OS), applications, and other running processes and their functions need the memory required to do blocks of memory space. This ensures that it is managed and assigned. Process management is a company strategy that aligns processes with goals, designs and implements process structures, measures process consistent with organizational goals, establishes systems, and educates managers and indicates regulation. Storage management refers to the storage of data resources, performance-enhancing software, and processes. Network virtualization, replacement, reflection, protection, contraction,

3. PROMETHEE

The PROMETHEE method is a multiple criteria decision analysis (MCDA) technique that allows decision-makers to evaluate alternatives based on various criteria. It involves selecting decision-makers (DMs), weighing the criteria, evaluating the effectiveness of alternatives against the criteria, selecting common values and related negligence and optional values for each criterion, and using PROMETHEE where necessary. The method uses common criterion functions, which is the primary difference between PROMETHEE and other MCDA techniques. The PROMETHEE method is particularly useful for complex decision-making problems that involve subjective judgment and expert opinions. It provides support to decision-makers by creating a valuable outreach relationship based on the pairing sequences between alternatives and the PROMETHEE mode. PROMETHEE, I identify incomparable and neglected alternatives by creating area rankings, while PROMETHEE Complete provides ranks for alternatives. The PROMETHEE family includes various methods, such as PROMETHEE VE, PROMETHEE for the problems of the segment, and PROMETHEE VEO for alternatives. The Selection Function of each criterion in PROMETHEE is often determined by the nature of the criteria and the decision-maker. There are six types of exams processes, including standard scale, semi-scale, linear priority criterion, Level scale, linear the area of. The Prometheus method is widely used for portfolio complexity applications. However, if there are more than seven alternatives and more than seven criteria evaluation tables, the decision-making process can become too complex to handle. In this situation, PROMETHEE becomes a black box, and a wood-structure can be adopted as an extension of PROMETHEE to help solve the problem. Overall, the PROMETHEE method is a valuable tool for decision-making processes that involve multiple criteria and subjective judgments. It allows decision-makers to evaluate alternatives based on different grounds and provides support for complex decision-making problems.

TABLE 1. Operating system

	Memory management	Process management	Storage management	protection and security	Software Features
Operating system 1	1350	1850	56.5	48.5	63.5
Operating system 2	1680	1650	58.5	76.75	95.3
Operating system 3	1560	1950	36.5	98.86	88.6
Operating system 4	1470	1850	39.5	89.16	98.4
Operating system 5	1560	1640	47.5	29.4	69.79
Max	1680	1950	58.5	98.86	98.4
Min	1350	1640	36.5	29.4	63.5
max-Min	330	310	22	69.46	34.9
	330	310	22	69.46	34.9

Table 1 shows the Operating system Memory management, Process management, Storage management, protection and security, Software Features. Figure 1. shows Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5From the figure 1 and table 1 it is seen that Operating system 2is showing the Maximum Value for Memory management and Operating system 1 is showing the minimum value. Operating system 3is showing the Maximum Value for Process management and Operating system 5 is showing the minimum value. Operating system 2is showing the Maximum Value for Storage management and Operating system 3 is showing the minimum value. Operating system 3is showing the Maximum Value for protection and security and Operating system 5 is showing the minimum value. Operating system 4is showing the Maximum Value for Software Features and Operating system 1 is showing the minimum value
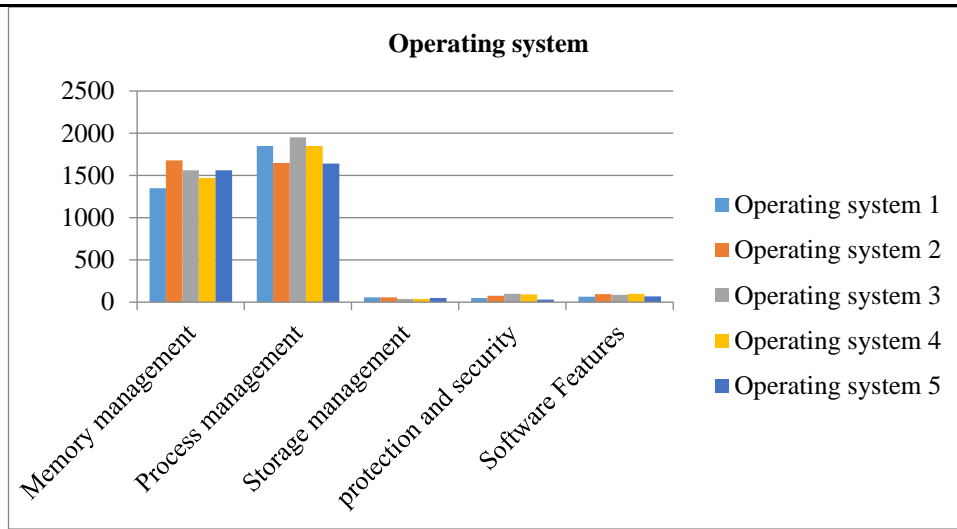
FIGURE 1. Operating system

TABLE 2. Normalized Matrix

	Memory management	Process management	Storage management	protection and security	Software Features
Operating system 1	0	0.6774194	0	1	0
Operating system 2	1	0.0322581	0.666667	0.1104869	0.911174785
Operating system 3	0.63636364	1	0	0.3183521	0.719197708
Operating system 4	0.36363636	0.6774194	1	0	1
Operating system 5	0.63636364	0	0.333333	0.4194757	0.180229226

Table 2 shows the Normalized matrix of Operating system or PROMETHEE the Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5 normalization are shown in the above tabulation. Table 2 shows the default matrix of Prometheus for the Operating system shown in the table above

TABLE 3. Pair wise Comparison

	Memory management	Process management	Storage management	protection and security	Software Features
D12	-1	0.6452	-0.667	0.88951	-0.911
D13	-0.6364	-0.3226	0	0.68165	-0.719
D14	-0.3636	0	-1	1	-1
D15	-0.6364	0.6774	-0.333	0.58052	-0.18
D21	1	-0.6452	0.6667	-0.8895	0.9112
D23	0.36364	-0.9677	0.6667	-0.2079	0.192
D24	0.63636	-0.6452	-0.333	0.11049	-0.089
D25	0.36364	0.0323	0.3333	-0.309	0.7309
D31	0.63636	0.3226	0	-0.6816	0.7192
D32	-0.3636	0.9677	-0.667	0.20787	-0.192
D34	0.27273	0.3226	-1	0.31835	-0.281
D35	0	1	-0.333	-0.1011	0.539
D41	0.36364	0	1	-1	1
D42	-0.6364	0.6452	0.3333	-0.1105	0.0888
D43	-0.2727	-0.3226	1	-0.3184	0.2808
D45	-0.2727	0.6774	0.6667	-0.4195	0.8198
D51	0.63636	-0.6774	0.3333	-0.5805	0.1802
D52	-0.3636	-0.0323	-0.333	0.30899	-0.731
D53	0	-1	0.3333	0.10112	-0.539
D54	0.27273	-0.6774	-0.667	0.41948	-0.82

Table 3 shows the Pair Wise Comparison of table 2 the Operating system 1, Operating system 2, Operating system 3, Operating system 4 and Operating system 5 comparing each row with other row on the tabulation.

TABLE 4. Preference Value

	Preference Value					
	0.2336	0.165	0.3355	0.102	0.042	
D12	0	0.107	0	0.091	0	0.197
D13	0	0	0	0.07	0	0.07
D14	0	0	0	0.102	0	0.102
D15	0	0.112	0	0.059	0	0.171
D21	0.2336	0	0.2237	0	0.039	0.496
D23	0.0849	0	0.2237	0	0.008	0.317
D24	0.1487	0	0	0.011	0	0.16
D25	0.0849	0.005	0.1118	0	0.031	0.233
D31	0.1487	0.053	0	0	0.03	0.232
D32	0	0.16	0	0.021	0	0.181
D34	0.0637	0.053	0	0.033	0	0.15
D35	0	0.165	0	0	0.023	0.188
D41	0.0849	0	0.3355	0	0.042	0.463
D42	0	0.107	0.1118	0	0.004	0.222
D43	0	0	0.3355	0	0.012	0.347
D45	0	0.112	0.2237	0	0.035	0.37
D51	0.1487	0	0.1118	0	0.008	0.268
D52	0	0	0	0.032	0	0.032
D53	0	0	0.1118	0.01	0	0.122
D54	0.0637	0	0	0.141	0	0.204

Table 4 shows the Performance value of the camera Operating system 1, Operating system 2, Operating system 3, Operating system 4 and Operating system 5. When compare to all others. And the last one is the sum of the same row.

TABLE 5. Sum of Performance Value

	Operating system 1	Operating system 2	Operating system 3	Operating system 4	Operating system 5		
Operating system 1	0	0.1974	0.0696	0.1021	0.3691	0.73819	0.1476
Operating system 2	0.4959	0	0.3168	0.15994	0.2331	1.20569	0.2411
Operating system 3	0.23244	0.1811	0	0.1495	0.1881	0.75109	0.1502
Operating system 4	0.46285	0.2222	0.3474	0	0.3703	1.40277	0.2806
Operating system 5	0.26813	0.0315	0.1222	0.20444	0	0.62628	0.1253
	1.45931	0.6322	0.8559	0.61598	1.1606		
	0.29186	0.1264	0.1712	0.1232	0.2321		

Table 5 shows the sum of all rows and column are applied on the last row. The sum of all row of performance value is arranged above tabulation and the diagonal values are zero.

TABLE 6. Positive flow, Negative Flow, Net flow

	positive flow	Negative Flow	Net flow	Rank
Operating system 1	0.14764	0.2919	-0.144224401	5
Operating system 2	0.24114	0.1264	0.114693148	2

Operating system 3	0.15022	0.1712	-0.0209648	3
Operating system 4	0.28055	0.1232	0.157356935	1
Operating system 5	0.12526	0.2321	-0.106860882	4

Table 6 shows ranking for the positive flow, Negative Flow, Net flow. Operating system 1, Operating system 2, Operating system 3, Operating system 4, and Operating system 5. In the above tabulation the Operating system 4is in the first rank and the last rank is Operating system 1
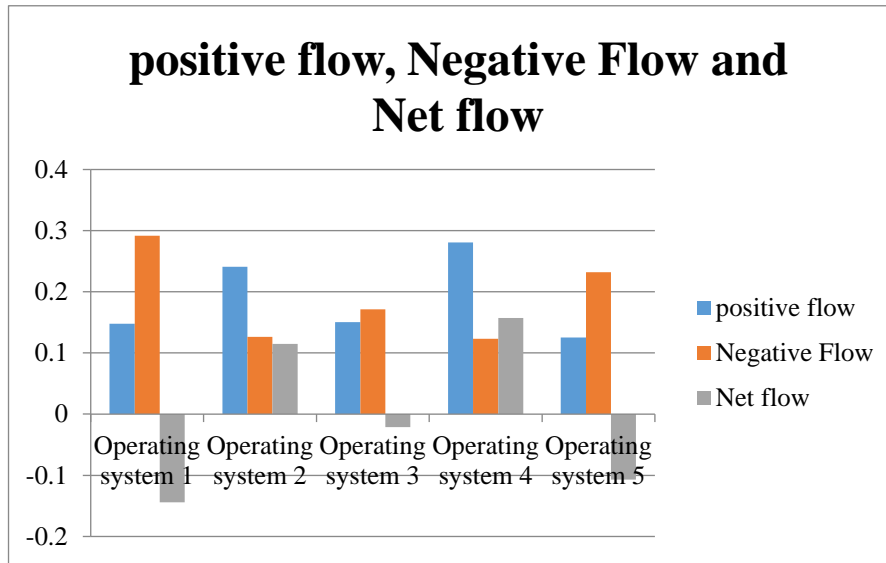

FIGURE 2. Positive flow, Negative Flow and Net flow

Figure 2 shows the Positive flow, Negative flow, Net flow. The Net flow value is Operating system 4 is showing the highest Value. Operating system 1 is showing the lowest Value.
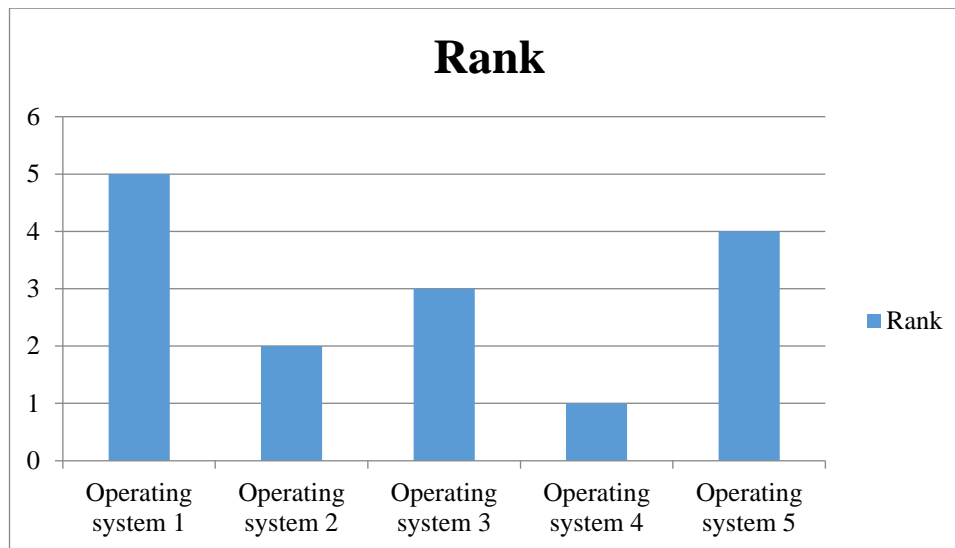

FIGURE 3. Shown the Rank

Figure 3 Shows Ranking of Operating system. Operating system 4 is got the first rank whereas is the Operating system 1is having the Lowest rank.

4. Conclusion

Based on the evaluation parameters of memory management, process management, storage management, protection and security, and software features, the PROMETHEE method was used to rank five operating systems: Operating system 1, Operating system 2, Operating system 3, Operating system 4, and Operating system 5. The PROMETHEE method is a multicriteria decision-making (MCDM) approach that can be used to rank alternatives based on multiple criteria. It involves

the use of common criterion functions to evaluate the performance of each alternative against the criteria, and then ranks the alternatives based on their positive and negative flows. According to the results obtained, Operating system 4 obtained the highest rank, indicating that it is the most suitable operating system based on the evaluation parameters considered. On the other hand, Operating system 1 received the lowest rank, suggesting that it is the least suitable operating system for the given criteria. It is important to note that the PROMETHEE method does not consider the importance of the criteria, and only evaluates the alternatives based on their performance against each criterion. Therefore, the decision maker should carefully consider the relative importance of each criterion before making a final decision.

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