# Details of different available systems

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| --- | --- | --- | --- | --- | --- | --- |
| **System** | **Cores of the system** | **Time required to encode an hour long video of different pixels** | | | **Initial cost** | **Cost per hour** |
|  |  | **720p** | **1080p** | **2160p** |  |  |
| 1 | 1 | 2 hours | 4 hours | 8 hours | 1000 | 0.10 |
| 2 | 2 | 1 hour | 2 hours | 4 hours | 3000 | 0.15 |
| 3 | 4 | 1 hour | 1 hour | 2 hours | 5000 | 0.50 |
| 4 | 8 | 0.5 hour | 1 hour | 1.5 hours | 10000 | 0.75 |
| 5 | 16 | 0.25 hour | 0.5 hour | 1 hour | 0 | 3.00 |

# Relative performance of different systems relative to System 1

A comparative analysis of performance of systems is described in the table given below. Total hours taken by a system to encode 50000 hours content on different resolutions is calculated by the formula, that is,

**Total hours (of each resolution by the given system) = encoding time (of one hour resolution by a given system) X 50,000 hours.**

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| --- | --- | --- | --- | --- | --- |
| **System** | **Cores of the system** | **Total Hours taken to encode content of 50000 hours by different systems on each of the resolutions** | | | **Performance relative to System 1** |
|  |  | **720p** | **1080p** | **2160p** |  |
| 1 | 1 | 100,000 hours | 200,000 hours | 400,000 hours |  |
| 2 | 2 | 50,000 hours | 100,000 hours | 200,000 hours | Twice as efficient and faster as System 1. |
| 3 | 4 | 50,000 hours | 50,000 hours | 100,000 hours | 71 % more faster than System 1 |
| 4 | 8 | 25000 hours | 50000 hours | 75,000 hours | 78 % more faster than System 1 |
| 5 | 16 | 12500 hours | 25000 hours | 50,000 hours | 87.5 % more faster than System 1 |

# Comparative analysis of cost of achieving milestones through different systems

## The output milestones as set by English Premier League (EPL)

Total hours to encode = 50,000 hours

* **25% of 50000 hours = 12500 hours** is required to be encoded within ***12 weeks*** (or ***2016 hours)***.
* Remaining hours = 50000-12500 = 37500
* 50% of the remaining hours = 18750 hours are required to be encoded in next 12 weeks (or 2016 hours).
* Remaining hours = 37500-18750 = 18750
* The rest of encoding is to be done in the remaining time of a year that is 28 weeks (or 4704 hours). Considering that a year is equal to 52 weeks.

The abovementioned calculations have been presented in tabular form below for better understanding.

|  |  |  |  |
| --- | --- | --- | --- |
| **Milestones** | **Given time in weeks (Hours)** | **Content (hours) to encode** | **Remaining hours to encode** |
| 1 | 12 weeks (2016 hours) | 12500 hours | 37500 |
| 2 | Next 12 weeks (2016 hours) | 18750 hours | 18750 hours |
| 3 | 27 weeks (4704 hours) | 18750 hours | Encoding completed |

## Cost of achieving each of the milestones by different systems

### Cost of using single instance of system for this purpose

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **System** | **Encoding speed of system for encoding 1 hour of content** | | | **Total time of encoding 1 hour content in all resolutions**  Formula; sum of all three hour values |
|  | **720p** | **1080p** | **2160p** |  |
| 1 | 2 hours | 4 hours | 8 hours | 14 hours |
| 2 | 1 hour | 2 hours | 4 hours | 7 hours |
| 3 | 1 hour | 1 hour | 2 hours | 4 hours |
| 4 | 0.5 hour | 1 hour | 1.5 hours | 2 hours |
| 5 | 0.25 hour | 0.5 hour | 1 hour | 1.75 hours |

As mentioned in above table each system has requires a number of hours to encode 1 hour content in different resolutions. Using the very data, total hours are calculated by multiplying it with the hours to encode during each milestone by each system.

Once hours are calculated then these hours are to be multiplied by hourly cost of each system and its initial cost is added into the product.

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **System** | **Hours required to achieve the milestones** | | | **Cost of achieving each of the milestone**  Total hours x hourly cost | | | **Total cost**  Milestone cost + initial cost |
|  | Milestone 1 | Milestone 2 | Milestone 3 | Milestone 1 | Milestone 2 | Milestone 3 |  |
| 1 | 175,000 h | 262,500 h | 262,500 h | 175,000 | 262,500 | 262,500 | 701,000 |
| 2 | 87,500 h | 131,250 h | 131,250 h | 13,125 | 19,688 | 19687.5 | 55,500 |
| 3 | 50,000 h | 75,000 h | 75,000 h | 25,000 | 37,500 | 37500 | 105,000 |
| 4 | 25000 h | 37,500 h | 37,500 h | 18,750 | 28,125 | 28125 | 85,000 |
| 5 | 21,875 h | 32,812 h | 32,812 h | 65,625 | 98,436 | 98436 | 262,497 |

After analyzing the data from the above table. I have come to the conclusion that ***system 2***is the ***cheapest*** among all whereas; ***system 5***is the ***fastest*** among all but ***2nd most costly*** of all.

The above mentioned data is for a single instance of each system. However, a single instance of a system is not sufficient to achieve milestones in the given time period. Therefore, multiple instances are required to achieve the milestones.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **System** | **Hours required to achieve the milestones** | | | **Required instances** | **Total cost including initial cost** |
|  | Milestone 1 | Milestone 2 | Milestone 3 |  | Formula;  instances x initial cost + hourly cost (hours) |
| 1 | 175,000 h | 262,500 h | 262,500 h | 87 | £ 787,000 |
| 2 | 87,500 h | 131,250 h | 131,250 h | 43 | £181,500 |
| 3 | 50,000 h | 75,000 h | 75,000 h | 24 | £220,000 |
| 4 | 25000 h | 37,500 h | 37,500 h | 13 | £205,000 |
| 5 | 21,875 h | 32,812 h | 32,812 h | 11 | £262,497 |

After thorough analysis of cost and processing time, I have concluded that 43 instances of system 2 are enough for achieving milestones of encoding videos and meeting the requirements of the contract.

# Recommendation

On the basis of cost of deliver the contract in the given timeframe through defined milestones. The company needs 43 instances of system 2 for this project. It would cost the company £181,500 in total.

# Analysis using windows performance monitor

I played the given youtube video link on full screen using google chrome and firefox browser. on Google Chrome thread were 23, 1 CPU was used and average CPU was 37.85. while using firefox browser 93 threads used 2 CPU and the average CPU 28.72.

Conclusion; firefox browser is more efficient as it uses less CPU resources.

As per my study Firefox browser is suitable for the users.