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This analysis is based on Jefford Risk Analysis paper. In this paper I am performing quantitative risk assessment based on the information given in the research paper file. The file has been uploaded on my GitHub link with name of **"Jefford-Quantitative Risk Analysis "**

Quantitative Assessment

The cost of data breach is considered as **$165** per record source: Cost of data breach source

ALE before countermeasure

ASSET	Cost of data breach	AV	VULNERABILITY	THREAT	IMPACT DUE TO		ANNUAL IMPACT	
					EF	SLE($) = AV * EF	ARO	ALE = SLE * ARO
PDIS Database Server	$165	8250000 ($165 * 50000)	• AMC is running on legacy operating systems and software (over 5 years older), and incompatibility between systems leaves vulnerabilities such as misconfiguration and security holes • Databases in AMC run a form of structured query language (SQL) attacker can use SQL injections to attack databases. An SQL injection is a very serious attack it can effect confidentiality, integrity, and availability of the AMC database. SQL injection attack can give to the attackers unrestricted access to an entire database	Hacking/ Malware	1	8250000	0.8	6600000
				Insider	0.09	742500	0.14	103950
							Total ALE before countermeasure	6703950

Calculations:

Cost of data breach * AV = $165*50000 = 8250000
Exposure factor is assumed as 1 and 0.09
Annual rate of occurrence is assumed as 0.8 and 0.14

SLE($) = AV * EF = 8250000
SLE($) = AV * EF = 742500
ALE = SLE * ARO = 6600000
ALE = SLE * ARO = 103950

Total ALE = 6703950

ALE after countermeasure 1

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ASSET	Cost of data breach	AV	VULNERABILITY	THREAT	IMPACT DUE TO		ANNUAL IMPACT	
					EF	SLE($) = AV * EF	ARO	ALE = SLE * ARO
PDIS Database Server	$165	8250000 ($165 * 50000)	• AMC is running on legacy operating systems and software (over 5 years older), and incompatibility between systems leaves vulnerabilities such as misconfiguration and security holes • Databases in AMC run a form of structured query language (SQL) attacker can use SQL injections to attack databases. An SQL injection is a very serious attack it can effect confidentiality, integrity, and availability of the AMC database. SQL injection attack can give to the attackers unrestricted access to an entire database	Hacking/ Malware	0.98	8085000	0.12	97020
				Insider	0.009	74250	0.8	59400
							Total ALE after countermeasure	156420

Calculations:

Cost of data breach * AV = $165*50000 = 8250000
Exposure factor is assumed as 0.98 and 0.009
Annual rate of occurrence is assumed as 0.12 and 0.8

SLE($) = AV * EF = 8085000
SLE($) = AV * EF = 74250
ALE = SLE * ARO = 97020
ALE = SLE * ARO = 59400

Total ALE = 156420

Benefit after countermeasure 1 = Total ALE before countermeasure 1 - Total ALE after countermeasure 1

Benefit after countermeasure 1 = 6703950 – 156420
Benefit after countermeasure 1 = 6,547,530

	Benefit after countermeasure 1 / Benefit after countermeasure 1 + Benefit after countermeasure 2
Budget that AMC can spend on countermeasure 1	6547530 / 6547530 + 6691740 = **0.494**

Budget that AMC can spend on countermeasure 1 = Benefit after countermeasure 1 / Benefit after countermeasure 1 + Benefit after countermeasure 2

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ALE after countermeasure - 2

ASSET	Cost of data breach	AV	VULNERABILITY	THREAT	IMPACT DUE TO		ANNUAL IMPACT	
					EF	SLE($) = AV * EF	ARO	ALE = SLE * ARO
PDIS Database Server	$165	8250000 ($165 * 50000)	• AMC is running on legacy operating systems and software (over 5 years older), and incompatibility between systems leaves vulnerabilities such as misconfiguration and security holes • Databases in AMC run a form of structured query language (SQL) attacker can use SQL injections to attack databases. An SQL injection is a very serious attack it can effect confidentiality, integrity, and availability of the AMC database. SQL injection attack can give to the attackers unrestricted access to an entire database	Hacking/ Malware	0.098	808500	0.014	11319
				Insider	0.0009	7425	0.12	891
							Total ALE after countermeasure	12210

Calculations:

Cost of data breach * AV = $165*50000 = 8250000
Exposure factor is assumed as 0.098 and 0.0009
Annual rate of occurrence is assumed as 0.014 and 0.12

SLE($) = AV * EF = 808500
SLE($) = AV * EF = 7425
ALE = SLE * ARO = 11319
ALE = SLE * ARO = 891

Total ALE = 12210

Benefit after countermeasure 2 = Total ALE before countermeasure 1 - Total ALE after countermeasure 2

Benefit after countermeasure 2 = 6703950 – 12210

Benefit after countermeasure 2 = 6691740

	Benefit after countermeasure 2 / Benefit after countermeasure 2 + Benefit after countermeasure 1
Budget that AMC can spend on countermeasure 2	6691740 / 6547530 + 6547530 = **0.505**

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Online reference for **Cost of data breech** : https://securityintelligence.com/cost-of-a-data-breach-2015/