



# 14<sup>th</sup> Mexican International Conference on Artificial Intelligence



## Solution of a Bi-Objective Purchasing Scheduling Problem with Constrained Funds using Pareto Optimization

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# The Purchasing Scheduling Problem (PSP)



**Scenario:** orders placed by an assistant or manager in a purchasing department given a general product catalogue.

An order  $k$

Purchasing  
Costs  $c_{ij}$

Demand  
Satisfaction

Product $i$	Supplier $j$	HP	Dell	Office Depot	Costs $c_{ij}$	...	Required units
					Max		
1	Computer	\$1,000	\$2,000	\$0	\$0	..	2
2	Printer	\$500	\$700	\$0	\$0	...	1
3	Scanner	\$1,000	\$2,000	\$0	\$0	...	5
4	Desk	\$0	\$0	\$1,500	\$1,000	..	11
5	Chair	\$0	\$0	\$3,000	\$2,500	...	7
...	...	...	...	...	...	...	...
10000	...	...	...	...	...	...	...

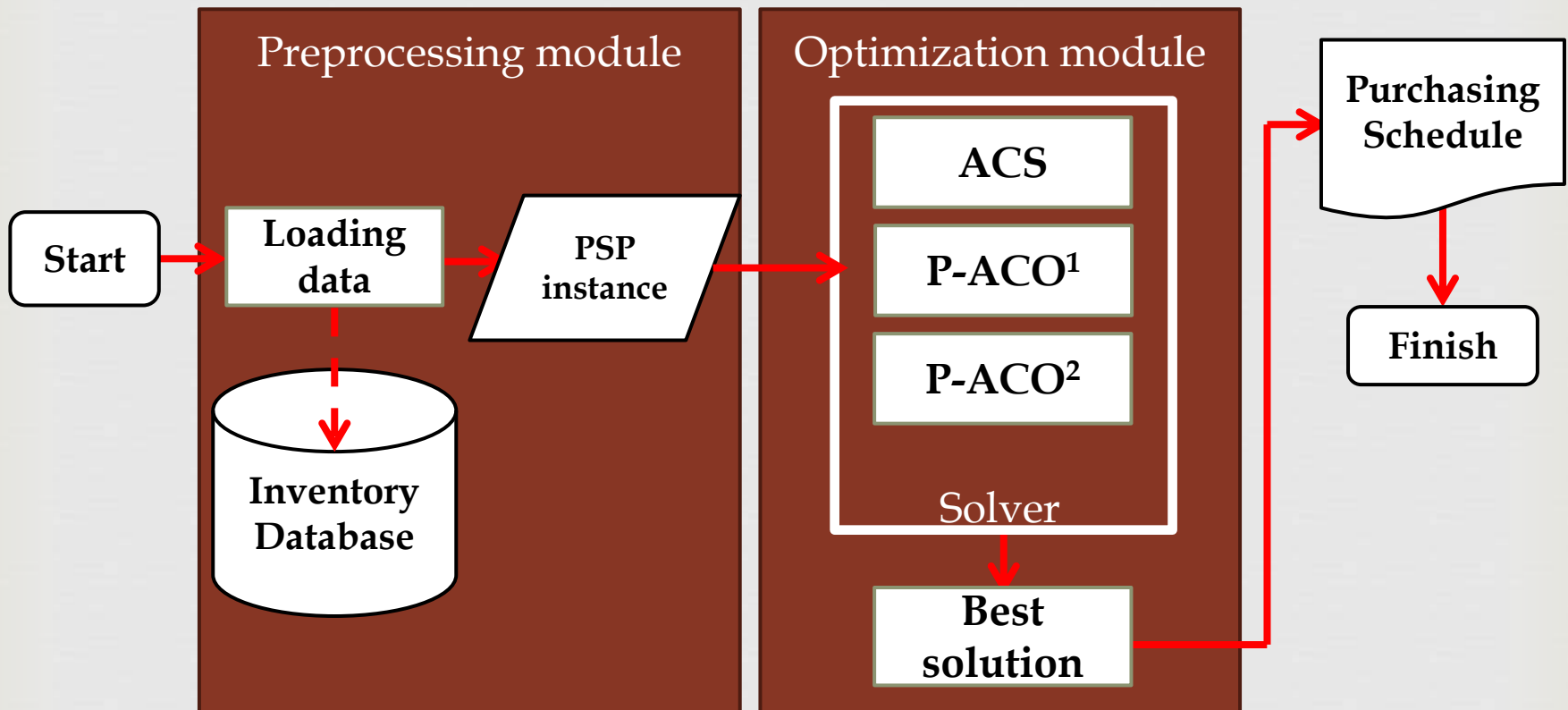
Available  
resources

Products per order:  $n_k$

Order  $k$ : Available funds: \$50,000

# Pareto Optimization (Ant Colony Optimization Approach)

## Architecture of solution



# Purchasing plans

Quantity to purchase

Solution provided by Ant Algorithms

Algoritmo de sistema de colonia de hormigas

Ejecutar algoritmo

Resultado

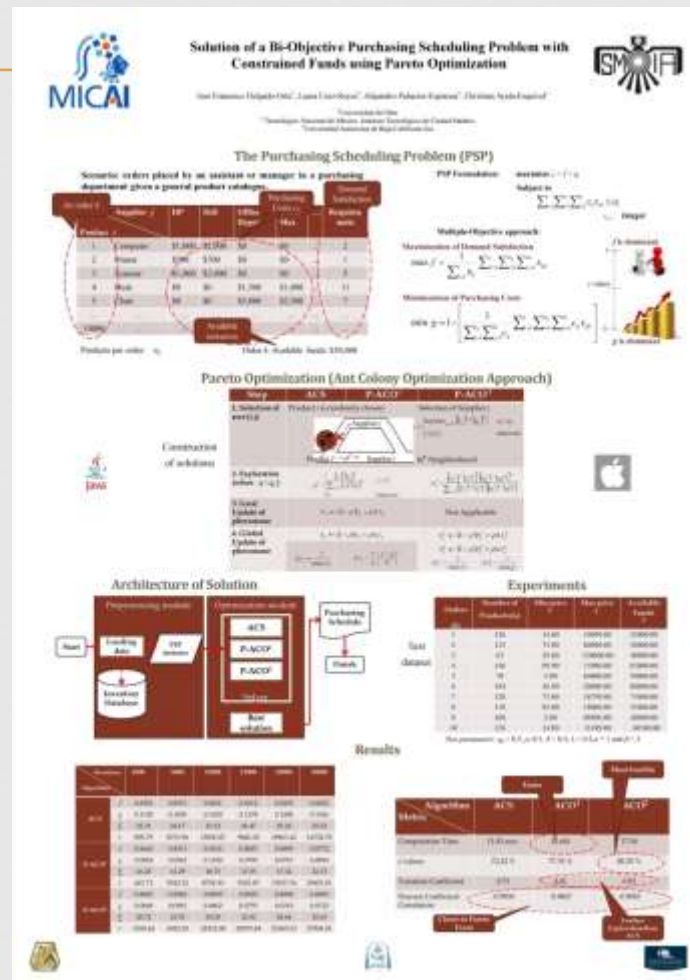
Número	Encargado	Producto	Descripción	Proveedor	Modelo	Precio...	Unidad...	Unidad...	SubTotal	Presupuesto
1	Jacinto Perez	Escritorio	Escritorio tipo office	Office Depot	4467B	789	6	4	4734.0	
		Cinta de aislar	Cinta de aislar de PVC color rojo	Steren	PT-13RO	14	6	4	56.0	
		Memoria USB	Memoria flash cruzer 16 gb roja usb 2.0	SanDisk	6546RRE	175	2	1	175.0	
		Tablet	Tablet Icon Tab A, excelente rendimiento	Acer	serie-A	8000	6	1	8000.0	
		Cable HDMI	cable plano HDMI extra plano de lujo 2 m	Master Computer	CM-HDMI2D	179	10	5	895.0	
		Libro	PC cuaderno software gratuito	Santillana	666599B7-336	210	3	0	0.0	
		Impresora	LaserJet Enterprise, alta velocidad, red eth...	HP	M1575MFP	10999	8	0	0.0	
		No Break	Micro SR trabaja con software Intelisoft d...	ISB	Micro SR	9899	7	0	0.0	
		Proyector	Proyector mediano portatil	LG	Hx350t	7113	9	0	0.0	
		Impresora, scanner	Multifuncional laserjet negro	HP	M1536DNF	6440	7	0	0.0	
		Memoria RAM	Memoria RAM DDR3 2 GB8	Acer	ACER-234	1500	5	0	0.0	
		Memoria USB	Memoria flash cruzer 16 gb roja usb 2.0	SanDisk	6546RRE	175	8	0	0.0	
		Impresora y fax	Impresora y fax de lata velocidad monocro...	Lexmark	X464DE	2500	5	0	0.0	
		Memoria USB	memoria flash 16gb usb 2.0	SanDisk	55526HYU	175	8	0	0.0	
		Teclado	Teclado generico	Toshiba	3336545	500	3	0	0.0	
		DVD	dvd rom slim sata negro	Samsung	66654224	1565	2	0	0.0	
		Computadora de escritorio	Inspiron, poco espacio con potente proce...	DELL	Inspiron 660s	5999	7	0	0.0	
		Inhibidor de señal	Eliminador de señal de celular portatil	Jammer	E0201	4406	7	0	0.0	
		Compensador de voltaje	Compensador de voltaje CVR tension 12...	ISB	CVR1000	800	5	0	0.0	
									13860.0	25000

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## Thank you



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