

ECE 462 "OOP Using C++ and JAVA"
Assignment 2, Part 1
Unpipelined 4-bit processor simulator

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Table of Contents

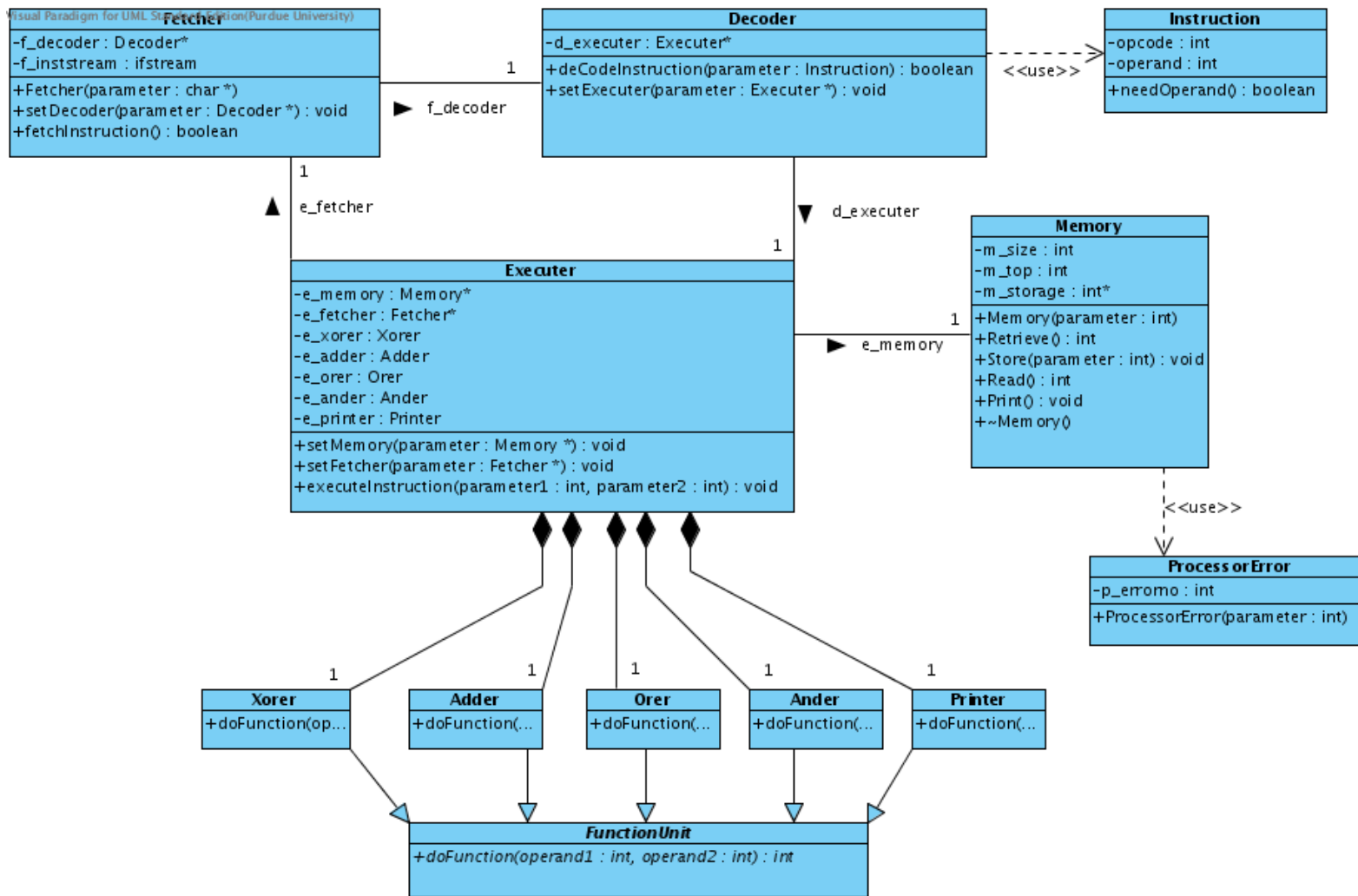
Overall class diagram3
Overall sequence diagram29

Table of Figures













Overall class diagram	3
Overall sequence diagram	29

Class Diagram

Overall class diagram



Summary

Name	Documentation
 Adder	Adds two integers
 Ander	Bitwise AND operation
 Decoder	Decodes the instruction obtained from Fetcher
 Executer	Executes the processor instruction.
 Fetcher	Fetcher - fetchers a processor instruction from the input file.
 FunctionUnit	Abstract class to derive all of the processor operations from.
 Instruction	Represents a processor's instruction
 Memory	Stores results of operations.
 Orer	Bitwise OR operation
 Printer	Print command
 ProcessorError	Exception thrown by some operations of Memory.
 Xorer	Bitwise XOR operation

Details


Adder


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Adds two integers

Operations

public doFunction (operand1 : int, operand2 : int) : int		
Parameters	operand1	
	Type	int
	Direction	in
	operand2	
	Type	int
	Direction	in
Query	false	

Relationships

Unnamed Generalization	
From	 FunctionUnit
Visibility	Unspecified

1 : Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	Composited
	Navigable	true


Ander


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Bitwise AND operation

Operations

public doFunction (operand1 : int, operand2 : int) : int		
Parameters	operand1	
	Type	int
	Direction	in
	operand2	
	Type	int
	Direction	in
Query	false	

Relationships

Unnamed Generalization	
From	 FunctionUnit
Visibility	Unspecified

1 : Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	Composited
	Navigable	true

Decoder

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Decodes the instruction obtained from Fetcher

Attributes


private d_executer : Executer			
Getter	false	Setter	false


Operations


public deCodeInstruction (parameter : Instruction) : boolean		
Parameters	parameter	
	Type	Instruction
	Direction	in
Query	false	

public setExecutor (parameter : Executor) : void		
Parameters	parameter	
	Type Modifier	*
	Type	Executor
	Direction	in
Query	false	

Relationships

Unnamed Usage	
To	 Instruction
Stereotypes	use

d_executor : Association		
To	Name	
	End Model Element	 Executor
	Multiplicity	1
	Visibility	private
	Aggregation Kind	None
	Navigable	true

f_decoder : Association		
From	Name	Value
	End Model Element	 Fetcher
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true

Executer

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Executes the processor instruction.

Attributes

private e_memory : Memory			
Getter	false	Setter	false

private e_fetcher : Fetcher			
Getter	false	Setter	false

private e_xorer : Xorer			
Getter	false	Setter	false

private e_adder : Adder			
Getter	false	Setter	false


private e_orer : Orer			
Getter	false	Setter	false

private e_ander : Ander			
Getter	false	Setter	false

private e_printer : Printer			
Getter	false	Setter	false


Operations


public setMemory (parameter : Memory) : void		
Parameters	parameter	
	Type Modifier	*
	Type	Memory
	Direction	in
Query	false	


public setFetcher (parameter : Fetcher) : void		
Parameters	parameter	
	Type Modifier	*
	Type	 Fetcher
	Direction	in
Query	false	


public executeInstruction (parameter1 : int, parameter2 : int) : void		
Parameters	parameter1	
	Type	int
	Direction	in
	parameter2	
	Type	int
	Direction	in
Query	false	


Relationships


Unnamed Association		
To	Name	Value
	End Model Element	 Xorer
	Multiplicity	1
	Visibility	private
	Aggregation Kind	None
	Navigable	true


1 : Association		
To	Name	Value
	End Model Element	 Adder
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true


1 : Association		
To	Name	Value
	End Model Element	 Orer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true

1 : Association		
To	Name	Value
	End Model Element	 Ander
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true

1 : Association		
To	Name	Value
	End Model Element	 Printer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true

e_memory : Association		
To	Name	Value
	End Model Element	 Memory
	Multiplicity	1
	Visibility	private
	Aggregation Kind	None
	Navigable	true

e_fetcher : Association		
To	Name	Value
	End Model Element	 Fetcher
	Multiplicity	1
	Visibility	private
	Aggregation Kind	None
	Navigable	true

d_executer : Association		
From	Name	Value
	End Model Element	 Decoder
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true

Fetcher

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Fetcher - fetchers a processor instruction from the input file.

Attributes

private f_decoder : Decoder			
Getter	false	Setter	false

private f_inststream : ifstream			
Getter	false	Setter	false

Operations

public Fetcher (parameter : char)		
Parameters	parameter	
	Type Modifier	*
	Type	char
	Direction	in
Query	false	
Documentation	Constructor.	


public setDecoder (parameter : Decoder) : void		
Parameters	parameter	
	Type Modifier	*
	Type	Decoder
	Direction	in
Query	false	

public fetchInstruction () : boolean


Query false

Relationships

f_decoder : Association

To	Name	Value
	End Model Element	 Decoder
	Multiplicity	1
	Visibility	private
	Aggregation Kind	None
	Navigable	true

e_fetcher : Association

From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true


FunctionUnit


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Abstract class to derive all of the processor operations from.


Operations


<i>public doFunction (operand1 : int, operand2 : int) : int</i>		
Parameters	operand1	
	Type	int
	Direction	in
	operand2	
	Type	int
	Direction	in
Query	true	


Relationships

Unnamed Generalization	
To	 Xorer
Visibility	Unspecified

Unnamed Generalization	
To	 Adder
Visibility	Unspecified

Unnamed Generalization	
To	 Orer
Visibility	Unspecified

Unnamed Generalization	
To	 Ander
Visibility	Unspecified

Unnamed Generalization	
To	 Printer
Visibility	Unspecified

Instruction

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Represents a processor's instruction

Attributes


private opcode : int			
Getter	false	Setter	false

private operand : int			
Getter	false	Setter	false

Operations

public needOperand () : boolean	
Query	false

Relationships

Unnamed Usage	
From	 Decoder
Stereotypes	use

Memory

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Stores results of operations.

Attributes

private m_size : int			
Getter	false	Setter	false

private m_top : int			
Getter	false	Setter	false

private m_storage : int			
Getter	false	Setter	false

Operations

public Memory (parameter : int)		
Parameters	parameter	
	Type	int
	Direction	in
Query	false	

public Retrieve () : int	
Query	false


public Store (parameter : int) : void		
Parameters	parameter	
	Type	int
	Direction	in
Query	false	


public Read () : int	
Query	false

public Print () : void	
Query	false

public ~Memory ()	
Query	false

Relationships

Unnamed Usage	
To	 ProcessorError
Stereotypes	use

e_memory : Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	None
	Navigable	true


Orer


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Bitwise OR operation

Operations

public doFunction (operand1 : int, operand2 : int) : int		
Parameters	operand1	
	Type	int
	Direction	inout
	operand2	
	Type	int
	Direction	inout
Query	false	

Relationships

Unnamed Generalization	
From	 FunctionUnit
Visibility	Unspecified

1 : Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	Composited
	Navigable	true


Printer


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Print command

Operations

public doFunction (operand1 : int, operand2 : int) : int		
Parameters	operand1	
	Type	int
	Direction	in
	operand2	
	Type	int
	Direction	in
	Default Value	0
Query	false	

Relationships

Unnamed Generalization	
From	 FunctionUnit
Visibility	Unspecified

1 : Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	Composited
	Navigable	true

ProcessorError

Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Exception thrown by some operations of Memory.


Attributes

private p_errorno : int			
Getter	false	Setter	false

Operations

public ProcessorError (parameter : int)		
Parameters	parameter	
	Type	int
	Direction	in
Query	false	

Relationships

Unnamed Usage	
From	 Memory
Stereotypes	use


Xorer


Name	Value
Active	false
Visibility	public
Leaf	false
Root	false
Documentation	Bitwise XOR operation

Operations

public doFunction (operand1 : int, operand2 : int) : int		
Parameters	operand1	
	Type	int
	Direction	in
	operand2	
	Type	int
	Direction	in
Query	false	

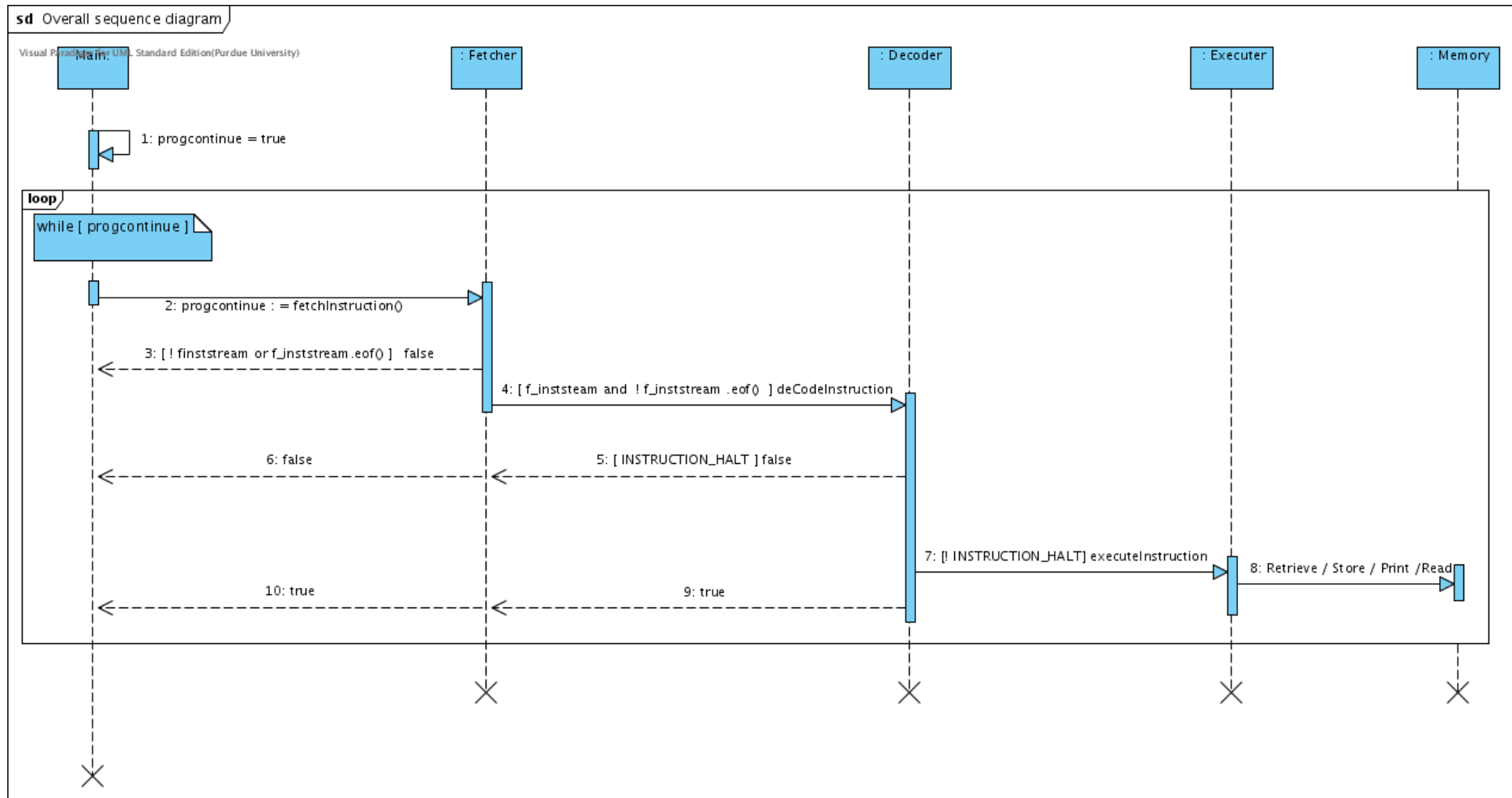
Relationships

Unnamed Generalization	
From	 FunctionUnit
Visibility	Unspecified









Unnamed Association		
From	Name	Value
	End Model Element	 Executer
	Multiplicity	Unspecified
	Visibility	private
	Aggregation Kind	Composited
	Navigable	true

Sequence Diagram

Overall sequence diagram




Summary


Name	Documentation
 : Fetcher	
 : Decoder	
 : Memory	
 : Executer	
	while [progcontinue]
 CombinedFragment	
 InteractionOperand	
 Main:	


Details


: Fetcher


Name	Value
Multiplicity	Unspecified
Base Classifier	 Fetcher
Active	false
Stopped	true
Multi Object	false


Relationships


progcontinue : = fetchInstruction() : Message		
From	Name	Value
	End Model Element	 Main:
Type	Message	
Sequence Number	2	
Asynchronous	false	


[! finststream or f_inststream.eof()] false : Message		
To	Name	Value
	End Model Element	 Main:
Type	Message	
Sequence Number	3	
Asynchronous	false	

[f_inststeam and ! f_inststream .eof()] deCodeInstruction : Message		
To	Name	Value
	End Model Element	
Type	Message	
Sequence Number	4	
Asynchronous	false	


[INSTRUCTION_HALT] false : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	5	
Asynchronous	false	

false : Message		
To	Name	Value
	End Model Element	 Main:
Type	Message	
Sequence Number	6	
Asynchronous	false	


true : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	9	
Asynchronous	false	

true : Message		
To	Name	Value
	End Model Element	 Main:
Type	Message	
Sequence Number	10	
Asynchronous	false	

: Decoder

Name	Value
Multiplicity	Unspecified
Base Classifier	 Decoder
Active	false
Stopped	true
Multi Object	false

Relationships


[f_inststeam and ! f_inststream .eof()] deCodeInstruction : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	4	
Asynchronous	false	

[INSTRUCTION_HALT] false : Message		
To	Name	Value
		End Model Element
Type	Message	
Sequence Number	5	
Asynchronous	false	


[! INSTRUCTION_HALT] executeInstruction : Message		
To	Name	Value
		End Model Element
Type	Message	
Sequence Number	7	
Asynchronous	false	

true : Message		
To	Name	Value
		End Model Element
Type	Message	
Sequence Number	9	
Asynchronous	false	


: Memory

Name	Value
Multiplicity	Unspecified
Base Classifier	 Memory
Active	false
Stopped	true
Multi Object	false


Relationships


Retrieve / Store / Print /Read : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	8	
Asynchronous	false	

: Executer

Name	Value
Multiplicity	Unspecified
Base Classifier	 Executer
Active	false
Stopped	true
Multi Object	false

Relationships

[! INSTRUCTION_HALT] executeInstruction : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	7	
Asynchronous	false	

Retrieve / Store / Print /Read : Message		
To	Name	Value
	End Model Element	
Type	Message	
Sequence Number	8	
Asynchronous	false	

 **N/A**

Relationships





Unnamed Anchor	
From	 CombinedFragment

 **CombinedFragment**

Interaction Operands

Value
InteractionOperand

Covered LifeLines

Name	Documentation
	
	
 Main:	
	




InteractionOperand





Main:

Name	Value
Multiplicity	Unspecified
Active	false
Stopped	true
Multi Object	false

Relationships

progcontinue = true : Message		
To	Name	Value
	End Model Element	 Main:
Type	Self Message	
Sequence Number	1	
Asynchronous	false	

progcontinue := fetchInstruction() : Message		
To	Name	Value
	End Model Element	
Type	Message	
Sequence Number	2	
Asynchronous	false	

[! finststream or f_inststream.eof()] false : Message		
From	Name	Value
	End Model Element	
Type	Message	
Sequence Number	3	
Asynchronous	false	

false : Message		
From	Name	Value
		End Model Element
Type	Message	
Sequence Number	6	
Asynchronous	false	

true : Message		
From	Name	Value
		End Model Element
Type	Message	
Sequence Number	10	
Asynchronous	false	