## Project 5

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# **Contents**

1	Hier	archical	Index		1
	1.1	Class I	Hierarchy		1
2	Clas	s Index			3
	2.1	Class I	₋ist		3
3	File	Index			5
	3.1	File Lis	st		5
4	Clas	s Docu	mentation	1	7
	4.1	ArrayC	ueue< Ite	emType > Class Template Reference	7
	4.2	Event	Struct Refe	erence	7
	4.3	Linked	List< Item	Type > Class Template Reference	8
		4.3.1	Member	Function Documentation	8
			4.3.1.1	clear()	8
			4.3.1.2	getEntry()	8
			4.3.1.3	getLength()	9
			4.3.1.4	insert()	9
			4.3.1.5	isEmpty()	9
			4.3.1.6	remove()	10
			4.3.1.7	replace()	10
	4.4	ListInte	erface< Ite	emType > Class Template Reference	11
		4.4.1	Member	Function Documentation	11
			4.4.1.1	clear()	11
			4410	gotEntry/\	44

ii CONTENTS

		4.4.1.3	getLer	ngth() .						 	 	 		 	 	12
		4.4.1.4	insert(	()						 	 	 		 	 	12
		4.4.1.5	isEmp	oty()						 	 	 		 	 	13
		4.4.1.6	remov	re()						 	 	 		 	 	13
		4.4.1.7	replac	e()						 	 	 		 	 	13
4.5	Merge	Class Ref	ference							 	 	 		 	 	14
4.6	Node<	< ItemType	e > Clas	ss Temp	late F	Refere	ence			 	 	 		 	 	15
	4.6.1	Construc	ctor & De	estructo	or Doc	cumer	ntatio	n		 	 	 		 	 	15
		4.6.1.1	Node(	<b>)</b> [1/2]						 	 	 		 	 	15
		4.6.1.2	Node(	<b>)</b> [2/2]						 	 	 		 	 	15
	4.6.2	Member	Functio	n Docur	menta	ation				 	 	 		 	 	15
		4.6.2.1	getIter	m()						 	 	 		 	 	15
		4.6.2.2	getNe	xt()						 	 	 		 	 	16
		4.6.2.3	setIter	m()						 	 	 		 	 	16
		4.6.2.4	setNe	xt()						 	 	 		 	 	16
4.7	Precor	ndViolated	Except (	Class R	efere	nce .				 	 	 		 	 	16
4.8	Priority	/Queue<	ItemTyp	e > Cla	iss Te	mpla	te Re	eferer	nce	 	 	 		 	 	17
	4.8.1	Member	Functio	n Docur	menta	ation				 	 	 		 	 	17
		4.8.1.1	peek()							 	 	 		 	 	17
4.9	Proces	ssData Str	uct Refe	rence						 	 	 		 	 	17
4.10	Sorted	IList< Item	nType >	Class	Templ	late F	Refere	ence		 	 	 		 	 	18
4.11	Teller S	Struct Refe	erence							 	 	 		 	 	18

CONTENTS

5	File I	Documentation	19
	5.1	ArrayQueue.cpp File Reference	19
		5.1.1 Detailed Description	19
	5.2	ArrayQueue.h File Reference	19
		5.2.1 Detailed Description	19
	5.3	LinkedList.cpp File Reference	19
		5.3.1 Detailed Description	20
	5.4	LinkedList.h File Reference	20
		5.4.1 Detailed Description	20
	5.5	ListInterface.h File Reference	20
		5.5.1 Detailed Description	21
	5.6	Merge.cpp File Reference	21
		5.6.1 Detailed Description	21
	5.7	Merge.h File Reference	22
		5.7.1 Detailed Description	22
	5.8	Node.cpp File Reference	22
		5.8.1 Detailed Description	22
	5.9	Node.h File Reference	23
		5.9.1 Detailed Description	23
	5.10	PA05.cpp File Reference	23
		5.10.1 Detailed Description	24
	5.11	PrecondViolatedExcept.cpp File Reference	24
		5.11.1 Detailed Description	24
	5.12	PrecondViolatedExcept.h File Reference	24
		5.12.1 Detailed Description	25
	5.13	PriorityQueue.cpp File Reference	25
		5.13.1 Detailed Description	25
	5.14	PriorityQueue.h File Reference	25
		5.14.1 Detailed Description	26
	5.15	SortedList.cpp File Reference	26
		5.15.1 Detailed Description	26
	5.16	SortedList.h File Reference	26
		5.16.1 Detailed Description	26
Ind	lov		27
1110	1CY		41

# **Chapter 1**

# **Hierarchical Index**

## 1.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

rrayQueue < ItemType >				
vent	 	 	 	7
stInterface < ItemType >	 	 	 	11
LinkedList< ItemType >	 	 		. 8
SortedList< ItemType >	 	 		. 18
gic_error				
PrecondViolatedExcept	 	 		. 16
erge	 	 	 	14
ode < ItemType >	 	 	 	15
riorityQueue < ItemType >	 	 	 	17
rocessData	 	 	 	17
eller	 	 	 	. 18

2 Hierarchical Index

# Chapter 2

# **Class Index**

## 2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

ArrayQueue< ItemType >	
Event	
_inkedList< ItemType >	
${\sf ListInterface} {\sf < ItemType} {\sf > \ldots $	1
Merge	1
Node< ItemType >	1
PrecondViolatedExcept	1
PriorityQueue< ItemType >	
ProcessData	1
SortedList< ItemType >	1
[eller	1

4 Class Index

# **Chapter 3**

# **File Index**

## 3.1 File List

Here is a list of all documented files with brief descriptions:

ArrayQueue.cpp	19
ArrayQueue.h	19
LinkedList.cpp	
Implementation file for the Linked List ADT	19
LinkedList.h	
Header file for the Linked List ADT	20
ListInterface.h	
Interface file for the List ADT	20
Merge.cpp	
Implementation file for the Merge sorting class	21
Merge.h	
Header file for the Merge sorting class	22
Node.cpp	
Implementation file for the Node class	22
Node.h	
Header file for the Node class	23
PA05.cpp	
Main driver for project 5	23
PrecondViolatedExcept.cpp	
Implementation file for the PrecondViolatedExcept class	24
PrecondViolatedExcept.h	
Header file for the PrecondViolatedExcept class	24
PriorityQueue.cpp	
Implementation file for the PriorityQueue class	25
PriorityQueue.h	25
SortedList.cpp	
Implementation file for the SortedList class	26
Cortad int h	26

6 File Index

## **Chapter 4**

## **Class Documentation**

## 4.1 ArrayQueue < ItemType > Class Template Reference

#### **Public Member Functions**

- bool **isEmpty** () const
- bool **enqueue** (const ItemType &newEntry)
- bool dequeue ()
- ItemType peekFront () const

#### **Public Attributes**

• int count

The documentation for this class was generated from the following files:

- ArrayQueue.h
- ArrayQueue.cpp

#### 4.2 Event Struct Reference

#### **Public Member Functions**

- bool operator> (const Event &rhs) const
- bool **operator**< (const Event &rhs) const
- bool operator!= (const Event &rhs) const

#### **Public Attributes**

- char type
- int startTime
- int duration
- · int customerID

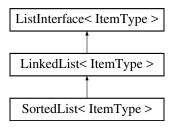
The documentation for this struct was generated from the following file:

PA05.cpp

8 Class Documentation

## 4.3 LinkedList < ItemType > Class Template Reference

Inheritance diagram for LinkedList< ItemType >:



#### **Public Member Functions**

- LinkedList (const LinkedList< ItemType > &aList)
- bool isEmpty () const
- int getLength () const
- bool insert (int newPosition, const ItemType &newEntry)
- · bool remove (int position)
- void clear ()
- ItemType getEntry (int position) const throw (PrecondViolatedExcept)
- · void replace (int position, const ItemType &newEntry) throw (PrecondViolatedExcept)

#### 4.3.1 Member Function Documentation

#### 4.3.1.1 clear()

```
template<class ItemType >
void LinkedList< ItemType >::clear ( ) [virtual]
```

Removes all entries from this list.

#### Postcondition

List contains no entries and the count of items is 0.

 $Implements \ ListInterface < ItemType >.$ 

#### 4.3.1.2 getEntry()

#### **Exceptions**

```
PrecondViolatedExcept | if position < 1 or position > getLength().
```

Implements ListInterface < ItemType >.

#### 4.3.1.3 getLength()

```
template<class ItemType >
int LinkedList< ItemType >::getLength ( ) const [virtual]
```

Gets the current number of entries in this list.

#### Returns

The integer number of entries currently in the list.

Implements ListInterface < ItemType >.

#### 4.3.1.4 insert()

Inserts an entry into this list at a given position.

#### Precondition

None.

#### Postcondition

If 1 <= position <= getLength() + 1 and the insertion is successful, newEntry is at the given position in the list, other entries are renumbered accordingly, and the returned value is true.

#### **Parameters**

newPosition	The list position at which to insert newEntry.
newEntry	The entry to insert into the list.

#### Returns

True if insertion is successful, or false if not.

Implements ListInterface < ItemType >.

## 4.3.1.5 isEmpty()

```
template < class ItemType >
bool LinkedList < ItemType >::isEmpty ( ) const [virtual]
```

Sees whether this list is empty.

10 Class Documentation

#### Returns

True if the list is empty; otherwise returns false.

Implements ListInterface < ItemType >.

#### 4.3.1.6 remove()

```
template<class ItemType >
bool LinkedList< ItemType >::remove (
          int position ) [virtual]
```

Removes the entry at a given position from this list.

Precondition

None.

#### Postcondition

If 1 <= position <= getLength() and the removal is successful, the entry at the given position in the list is removed, other items are renumbered accordingly, and the returned value is true.

#### **Parameters**

	position	The list position of the entry to remove.
--	----------	---

#### Returns

True if removal is successful, or false if not.

Implements ListInterface < ItemType >.

#### 4.3.1.7 replace()

#### **Exceptions**

```
PrecondViolatedExcept | if position < 1 or position > getLength().
```

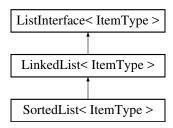
Implements ListInterface < ItemType >.

The documentation for this class was generated from the following files:

- · LinkedList.h
- LinkedList.cpp

## 4.4 ListInterface < ItemType > Class Template Reference

Inheritance diagram for ListInterface < ItemType >:



#### **Public Member Functions**

- virtual bool isEmpty () const =0
- virtual int getLength () const =0
- virtual bool insert (int newPosition, const ItemType &newEntry)=0
- virtual bool remove (int position)=0
- virtual void clear ()=0
- virtual ItemType getEntry (int position) const =0
- virtual void replace (int position, const ItemType &newEntry)=0

#### 4.4.1 Member Function Documentation

#### 4.4.1.1 clear()

```
template<class ItemType >
virtual void ListInterface< ItemType >::clear ( ) [pure virtual]
```

Removes all entries from this list.

#### Postcondition

List contains no entries and the count of items is 0.

Implemented in LinkedList< ItemType >.

## 4.4.1.2 getEntry()

Gets the entry at the given position in this list.

#### Precondition

```
1 <= position <= getLength().
```

#### Postcondition

The desired entry has been returned.

12 Class Documentation

#### **Parameters**

tion of the desired entry.	position
----------------------------	----------

#### Returns

The entry at the given position.

Implemented in LinkedList< ItemType >.

#### 4.4.1.3 getLength()

```
template<class ItemType >
virtual int ListInterface< ItemType >::getLength ( ) const [pure virtual]
```

Gets the current number of entries in this list.

#### Returns

The integer number of entries currently in the list.

Implemented in LinkedList< ItemType >.

#### 4.4.1.4 insert()

Inserts an entry into this list at a given position.

#### Precondition

None.

#### Postcondition

If  $1 \le position \le getLength() + 1$  and the insertion is successful, newEntry is at the given position in the list, other entries are renumbered accordingly, and the returned value is true.

#### **Parameters**

newPosition	The list position at which to insert newEntry.
newEntry	The entry to insert into the list.

#### Returns

True if insertion is successful, or false if not.

Implemented in LinkedList< ItemType >.

#### 4.4.1.5 isEmpty()

```
template<class ItemType >
virtual bool ListInterface< ItemType >::isEmpty ( ) const [pure virtual]
```

Sees whether this list is empty.

#### Returns

True if the list is empty; otherwise returns false.

Implemented in LinkedList< ItemType >.

#### 4.4.1.6 remove()

Removes the entry at a given position from this list.

### Precondition

None.

#### Postcondition

If 1 <= position <= getLength() and the removal is successful, the entry at the given position in the list is removed, other items are renumbered accordingly, and the returned value is true.

#### Parameters

position	The list position of the entry to remove.

#### Returns

True if removal is successful, or false if not.

Implemented in LinkedList< ItemType >.

#### 4.4.1.7 replace()

```
template<class ItemType >
virtual void ListInterface< ItemType >::replace (
```

14 Class Documentation

```
int position,
const ItemType & newEntry ) [pure virtual]
```

Replaces the entry at the given position in this list.

#### Precondition

```
1 <= position <= getLength().
```

#### Postcondition

The entry at the given position is newEntry.

#### **Parameters**

position	The list position of the entry to replace.
newEntry	The replacement entry.

Implemented in LinkedList< ItemType >.

The documentation for this class was generated from the following file:

· ListInterface.h

## 4.5 Merge Class Reference

**Public Member Functions** 

- Merge (int toSort[], long count)
- void merge (long first, long mid, long last)
- void sort (long first, long last)

#### **Public Attributes**

- · int count
- int \* data
- double elapsedTime
- int comparisonCount
- int swapCount

#### **Friends**

• ostream & operator << (ostream &out, const Merge &merge)

The documentation for this class was generated from the following files:

- Merge.h
- Merge.cpp

## 4.6 Node < ItemType > Class Template Reference

#### **Public Member Functions**

• Node ()

Default constructor for the class.

• Node (const ItemType &anItem)

Copy constructor for the class.

Node (const ItemType &anItem, Node < ItemType > \*nextNodePtr)

Constructor for the class.

• void setItem (const ItemType &anItem)

setItem function

void setNext (Node < ItemType > \*nextNodePtr)

setNext function

• ItemType getItem () const

getItem function

 Node < ItemType > \* getNext () const getNext function

#### 4.6.1 Constructor & Destructor Documentation

```
4.6.1.1 Node() [1/2]

template<class ItemType >
Node< ItemType >::Node ( )
```

Default constructor for the class.

constructs the class

Copy constructor for the class.

constructs the class using a previously constructed reference

#### 4.6.2 Member Function Documentation

#### 4.6.2.1 getItem()

```
template<class ItemType >
ItemType Node< ItemType >::getItem ( ) const
```

getItem function

returns current item

16 Class Documentation

#### 4.6.2.2 getNext()

setItem function

Sets the current item to another item

#### 4.6.2.4 setNext()

setNext function

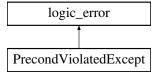
Sets the next item to an item

The documentation for this class was generated from the following files:

- Node.h
- Node.cpp

## 4.7 PrecondViolatedExcept Class Reference

Inheritance diagram for PrecondViolatedExcept:



**Public Member Functions** 

• PrecondViolatedExcept (const std::string &message="")

The documentation for this class was generated from the following files:

- · PrecondViolatedExcept.h
- PrecondViolatedExcept.cpp

## 4.8 PriorityQueue < ItemType > Class Template Reference

#### **Public Member Functions**

- PriorityQueue (const PriorityQueue &pq)
- bool isEmpty () const
- bool **enqueue** (const ItemType &newEntry)
- bool dequeue ()
- ItemType peek () const throw (PrecondViolatedExcept)

#### 4.8.1 Member Function Documentation

#### 4.8.1.1 peek()

```
template<class ItemType >
ItemType PriorityQueue< ItemType >::peek ( ) const throw PrecondViolatedExcept)
```

#### **Exceptions**

PrecondViolatedExcept | if priority queue is empty.

The documentation for this class was generated from the following files:

- PriorityQueue.h
- PriorityQueue.cpp

## 4.9 ProcessData Struct Reference

#### **Public Attributes**

- int cpuTime
- int virtualTime
- int maxWaitTime
- int avgWaitTime
- · int maxLineLength
- int avgLineLength

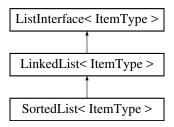
The documentation for this struct was generated from the following file:

PA05.cpp

18 Class Documentation

## 4.10 SortedList < ItemType > Class Template Reference

Inheritance diagram for SortedList< ItemType >:



#### **Public Member Functions**

- SortedList (const SortedList< ItemType > &sList)
- bool insertSorted (const ItemType &newEntry)
- bool removeSorted (const ItemType &anEntry)
- int getPosition (const ItemType &anEntry) const

The documentation for this class was generated from the following files:

- · SortedList.h
- · SortedList.cpp

#### 4.11 Teller Struct Reference

#### **Public Attributes**

• bool available

The documentation for this struct was generated from the following file:

PA05.cpp

## **Chapter 5**

## **File Documentation**

## 5.1 ArrayQueue.cpp File Reference

```
#include <iostream>
#include "ArrayQueue.h"
```

#### 5.1.1 Detailed Description

ADT queue: Circular array-based implementation.

## 5.2 ArrayQueue.h File Reference

```
#include "PrecondViolatedExcept.h"
#include "ArrayQueue.cpp"
```

#### Classes

class ArrayQueue< ItemType >

#### 5.2.1 Detailed Description

ADT queue: Circular array-based implementation.

## 5.3 LinkedList.cpp File Reference

Implementation file for the Linked List ADT.

```
#include "LinkedList.h"
#include "Node.h"
#include "assert.h"
#include "PrecondViolatedExcept.h"
```

20 File Documentation

#### 5.3.1 Detailed Description

Implementation file for the Linked List ADT.

**Author** 

Someone at Pearson (I didn't code any of this)

Specifies the functions of the linked list data type

Version

0.10

## 5.4 LinkedList.h File Reference

Header file for the Linked List ADT.

```
#include "ListInterface.h"
#include "Node.h"
#include "PrecondViolatedExcept.h"
#include "LinkedList.cpp"
```

#### Classes

class LinkedList< ItemType >

### 5.4.1 Detailed Description

Header file for the Linked List ADT.

Author

Someone at Pearson (I didn't code any of this)

Specifies the members of the Linked list ADT

Version

0.10

## 5.5 ListInterface.h File Reference

Interface file for the List ADT.

## Classes

class ListInterface< ItemType >

#### 5.5.1 Detailed Description

Interface file for the List ADT.

**Author** 

Rory Pierce

Specifies the implementation contract of the List ADT

Version

0.10

Adapted from Frank M. Carrano and Timothy M. Henry Copyright (c) 2017 Pearson Education, Hoboken, New Jersey.

## 5.6 Merge.cpp File Reference

Implementation file for the Merge sorting class.

```
#include "Merge.h"
```

#### **Functions**

• ostream & operator << (ostream &out, const Merge &merge)

#### 5.6.1 Detailed Description

Implementation file for the Merge sorting class.

Author

Willis Allstead

Specifies the functions of the Merge sorting class

Version

1.0

22 File Documentation

## 5.7 Merge.h File Reference

Header file for the Merge sorting class.

```
#include <iostream>
#include <ctime>
```

#### Classes

• class Merge

#### 5.7.1 Detailed Description

Header file for the Merge sorting class.

Author

Willis Allstead

Specifies the members of the Merge sorting class

Version

1.0

## 5.8 Node.cpp File Reference

Implementation file for the Node class.

```
#include "Node.h"
```

## 5.8.1 Detailed Description

Implementation file for the Node class.

Author

Someone at Pearson (I didn't code any of this)

Specifies the functions of the Node class

Version

0.10

5.9 Node.h File Reference 23

## 5.9 Node.h File Reference

Header file for the Node class.

```
#include "Node.cpp"
```

#### Classes

```
    class Node < ItemType >
```

#### 5.9.1 Detailed Description

Header file for the Node class.

Author

Someone at Pearson (I didn't code any of this)

Specifies the members of the Node class and defines function parameters

Version

0.10

## 5.10 PA05.cpp File Reference

Main driver for project 5.

```
#include <iostream>
#include <string>
#include <fstream>
#include <ctime>
#include "Merge.h"
#include "ArrayQueue.h"
#include "PriorityQueue.h"
```

#### **Classes**

- struct Event
- struct Teller
- struct ProcessData

24 File Documentation

#### **Functions**

- void **populateFile** (int, string const &)
- ProcessData **simulate** (PriorityQueue< Event > &, ArrayQueue< Event > bankLines[], int, int)
- int processArrival (Event, PriorityQueue < Event > &, ArrayQueue < Event > &, Teller &, int)
- int processDeparture (Event, PriorityQueue < Event > &, ArrayQueue < Event > &, Teller &, int)
- int main ()
- void populateFile (int count, std::string const &file)

#### 5.10.1 Detailed Description

Main driver for project 5.

Author

Willis Allstead

Version

1.0

## 5.11 PrecondViolatedExcept.cpp File Reference

Implementation file for the PrecondViolatedExcept class.

```
#include "PrecondViolatedExcept.h"
```

#### 5.11.1 Detailed Description

Implementation file for the PrecondViolatedExcept class.

Author

Someone at Pearson (I didn't code any of this)

Specifies function of the class.

Version

0.10

## 5.12 PrecondViolatedExcept.h File Reference

Header file for the PrecondViolatedExcept class.

```
#include <stdexcept>
#include <string>
```

#### Classes

• class PrecondViolatedExcept

#### 5.12.1 Detailed Description

Header file for the PrecondViolatedExcept class.

Author

Someone at Pearson (I didn't code any of this)

Specifies the members of the Node class and defines function parameters

Version

0.10

## 5.13 PriorityQueue.cpp File Reference

Implementation file for the PriorityQueue class.

## 5.13.1 Detailed Description

Implementation file for the PriorityQueue class.

Author

Someone at Pearson (I didn't code any of this)

Specifies function of the class.

Version

0.10

## 5.14 PriorityQueue.h File Reference

```
#include "SortedList.h"
#include "PrecondViolatedExcept.h"
#include "PriorityQueue.cpp"
```

## Classes

class PriorityQueue < ItemType >

26 File Documentation

## 5.14.1 Detailed Description

ADT priority queue: ADT sorted list implementation.

## 5.15 SortedList.cpp File Reference

Implementation file for the SortedList class.

```
#include <ctime>
```

## 5.15.1 Detailed Description

Implementation file for the SortedList class.

Author

Someone at Pearson (I didn't code any of this)

Specifies function of the class.

Version

0.10

## 5.16 SortedList.h File Reference

```
#include <memory>
#include "LinkedList.h"
#include "Node.h"
#include "PrecondViolatedExcept.h"
#include "SortedList.cpp"
```

#### Classes

class SortedList< ItemType >

## 5.16.1 Detailed Description

ADT sorted list using ADT list.

# Index

ArrayQueue < ItemType >, 7	Merge.cpp, 21	
ArrayQueue.cpp, 19	Merge.h, 22	
ArrayQueue.h, 19	-	
•	Node	
clear	getItem, 15	
LinkedList, 8	getNext, 15	
ListInterface, 11	Node, 15	
	setItem, 16	
Event, 7	setNext, 16	
	Node< ItemType >, 15	
getEntry	Node.cpp, 22	
LinkedList, 8	Node.h, 23	
ListInterface, 11	,	
getItem	PA05.cpp, 23	
Node, 15	peek	
getLength	PriorityQueue, 17	
LinkedList, 9	PrecondViolatedExcept, 16	
ListInterface, 12	PrecondViolatedExcept.cpp, 24	
getNext	PrecondViolatedExcept.h, 24	
Node, 15	PriorityQueue	
	peek, 17	
insert	•	
LinkedList, 9	PriorityQueue < ItemType >, 17	
ListInterface, 12	PriorityQueue.cpp, 25	
isEmpty	PriorityQueue.h, 25	
LinkedList, 9	ProcessData, 17	
ListInterface, 13	romovo	
	remove	
LinkedList	LinkedList, 10	
clear, 8	ListInterface, 13	
getEntry, 8	replace	
getLength, 9	LinkedList, 10	
insert, 9	ListInterface, 13	
isEmpty, 9		
remove, 10	setItem	
replace, 10	Node, 16	
LinkedList< ItemType >, 8	setNext	
LinkedList.cpp, 19	Node, 16	
LinkedList.h, 20	SortedList< ItemType >, 18	
ListInterface	SortedList.cpp, 26	
clear, 11	SortedList.h, 26	
	T.II. 40	
getEntry, 11	Teller, 18	
getLength, 12		
insert, 12		
isEmpty, 13		
remove, 13		
replace, 13		
ListInterface < ItemType >, 11		
ListInterface.h, 20		
Morgo 14		
Merge, 14		