CSIR - Distributed Application Manager Functional Requirements and Design Document

101 Solutions

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Version 1.7

Francois Germishuizen	11093618
Jaco Swanepoel	11016354
Henko van Koesveld	11009315

Change Log

Date	Version	Description	Done by
13 Sept	Version 0.1	Document Created	Jaco
13 Sept	Version 0.2	Added usecase diagrams	Jaco
13 Sept	Version 0.3	Added AddBuild, RequestSysInfo and GetSysInfo usecase	Jaco
13 Sept	Version 0.4	Added Upcoming usecases and Simulations	Jaco
13 Sept	Version 0.5	Added overall processes and adjusted margins	Jaco
13 Sept	Version 0.6	Added AddSlave, StartServer, StopServer and SetPort usecase	Jaco
13 Sept	Version 0.7	Added Glossary	Jaco
13 Sept	Version 0.8	Added Class diagrams	Jaco
13 Sept	Version 0.9	Added AddBuild via network usecase	Jaco
13 Sept	Version 1.0	Added description of communication and strategies	Henko
15 Sept	Version 1.1	Final grammar check	Jaco
10 Oct	Version 1.2	Added simulations to Use cases away from upcoming	Jaco
12 Oct	Version 1.3	Updated usecase diagrams	Jaco
29 Oct	Version 1.4	Added Database section	Francois
31 Oct	Version 1.5	Additions to strategies	Henko
31 Oct	Version 1.6	Added file watcher section	Henko
31 Oct	Version 1.7	Updated some diagrams	Jaco

Contents

1 Overview

1.1 Background

The CSIR is actively developing a distributed simulation framework that ties in with various other real systems and is used to exchange information between them. The client has a number of configurations of this system depending on the requirements of the client which can involve various external applications as well.

One of the issues the client has is to quickly distribute the latest build or configuration files of their software over various computers that are needed for an experiment. In some cases the same computers may be used for other experiments which mean each of the computers may need to have various builds and configuration options.

Another issue they experience is the running, stopping and restarting of the complete simulation. During a simulation it may be determined that certain configuration options may need to be changed and distributed to the affected machines, in which case either all or some components will need to be restarted which can become tedious and time consuming.

1.2 Business opportunity

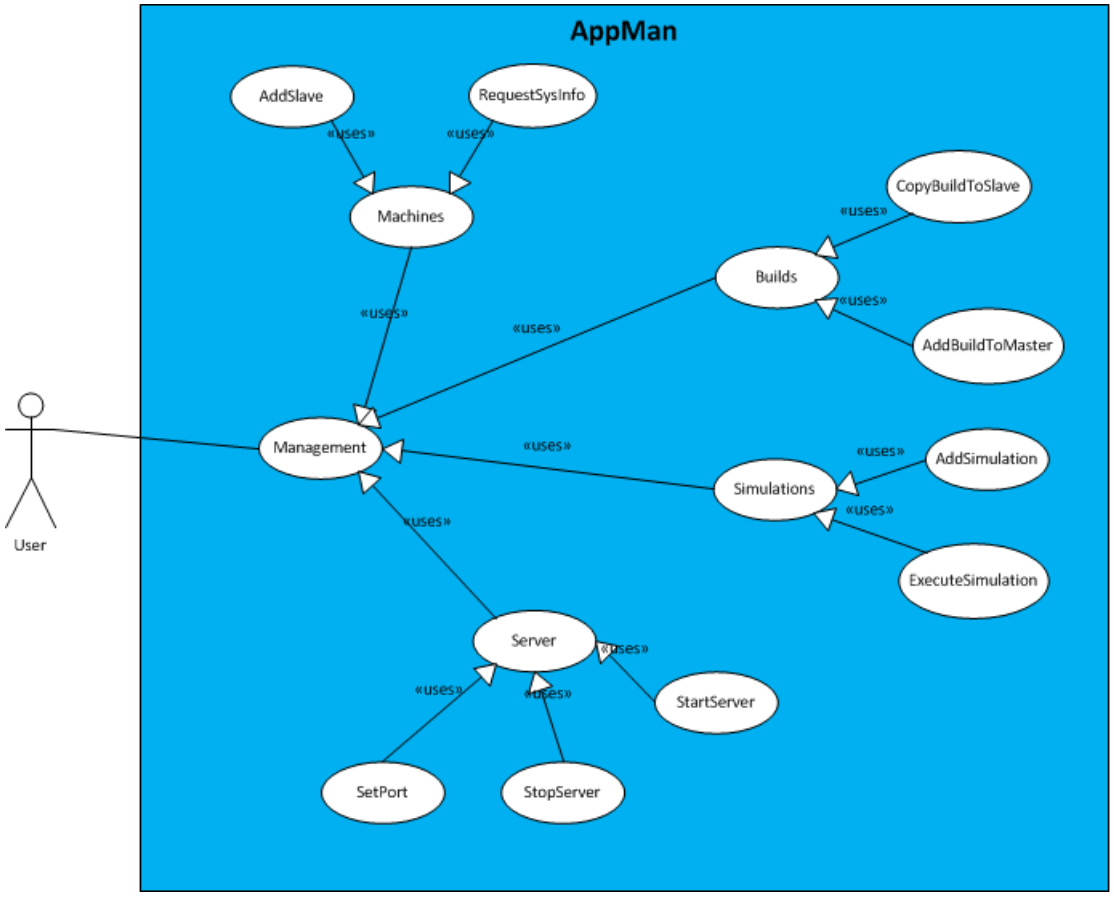
The goal of our project is to develop an application which is able to maintain various build versions of the simulation framework and distribute these builds to certain designated machines that may be required for an experiment. The application will monitor system statistics of the various machines attached to an experiment and will have the ability to execute applications on those machines which will have different configuration options.

The application will consist of a master and slave component where the master is used to control the distribution of slaves. From the master one will be able to start an experiment which will run the relevant applications on all the necessary machines.

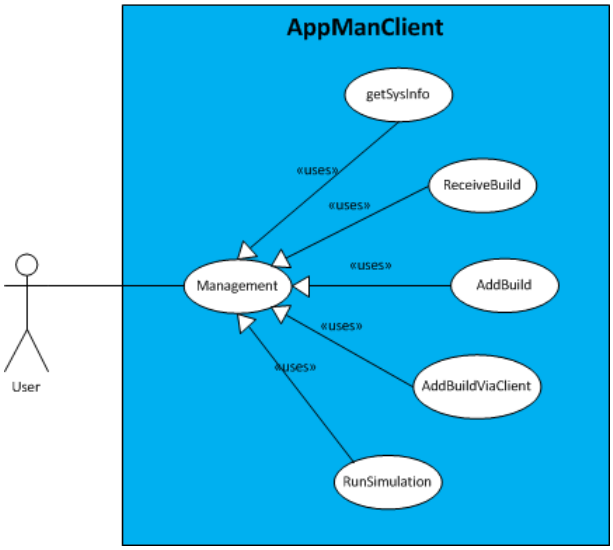
2 Use Cases

We have both a master and slave application. The master is called AppMan and the slave is called AppManClient.

Below is a use case of the AppMan system as it currently is:

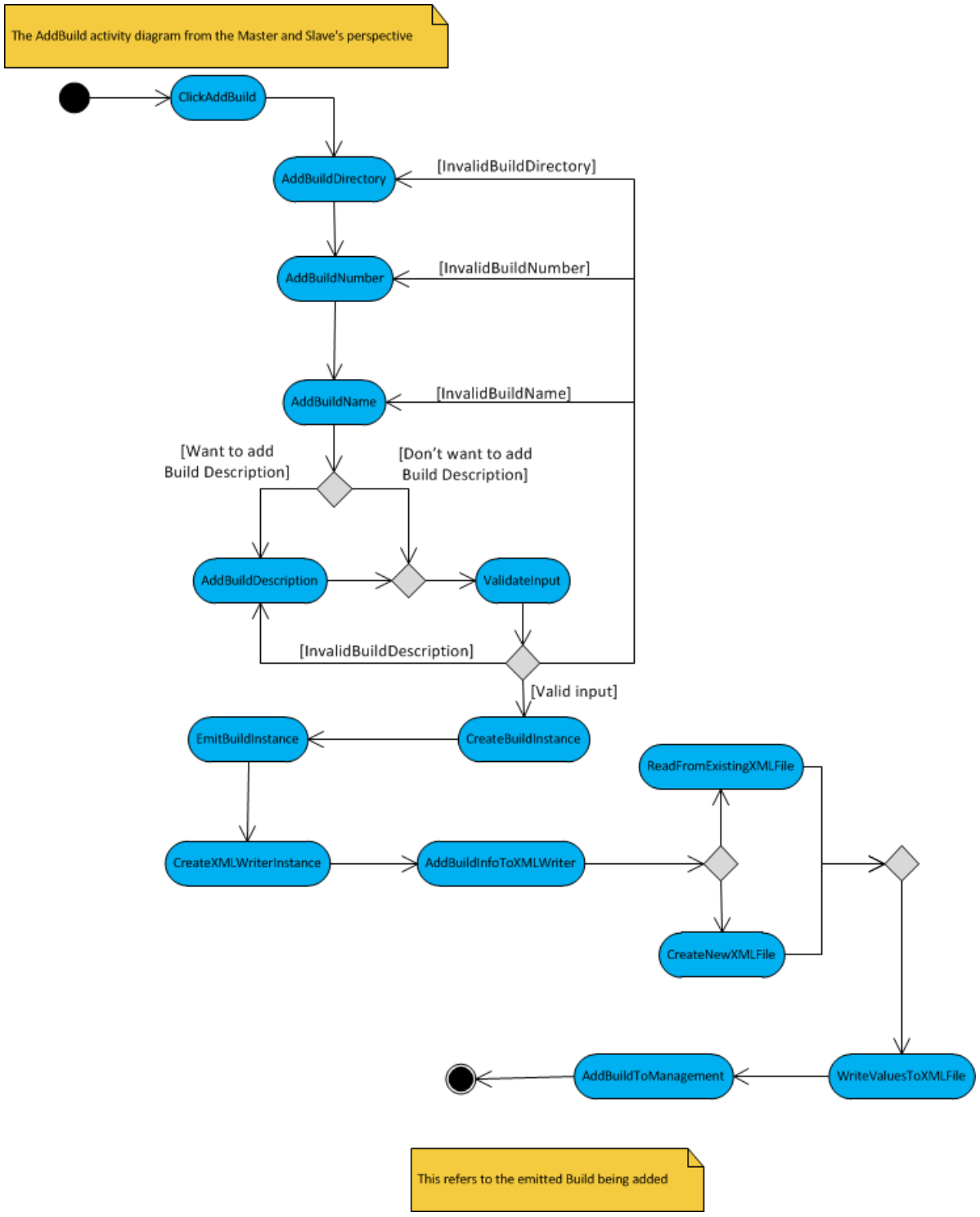


Below is a use case diagram of the AppManClient system as it currently is:



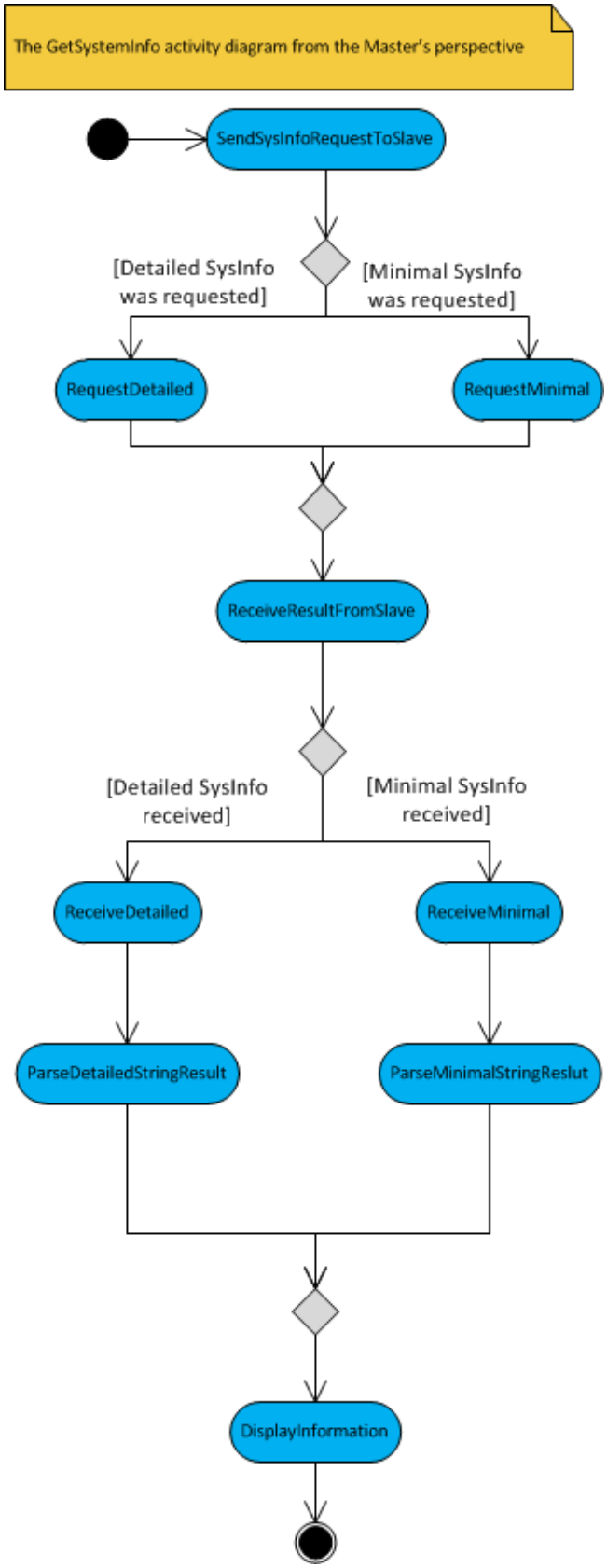
2.1 AddBuild usecase

The following activity diagram is applicable to both AddBuildToMaster in AppMan as well as AddBuildViaClient in AppManClient.



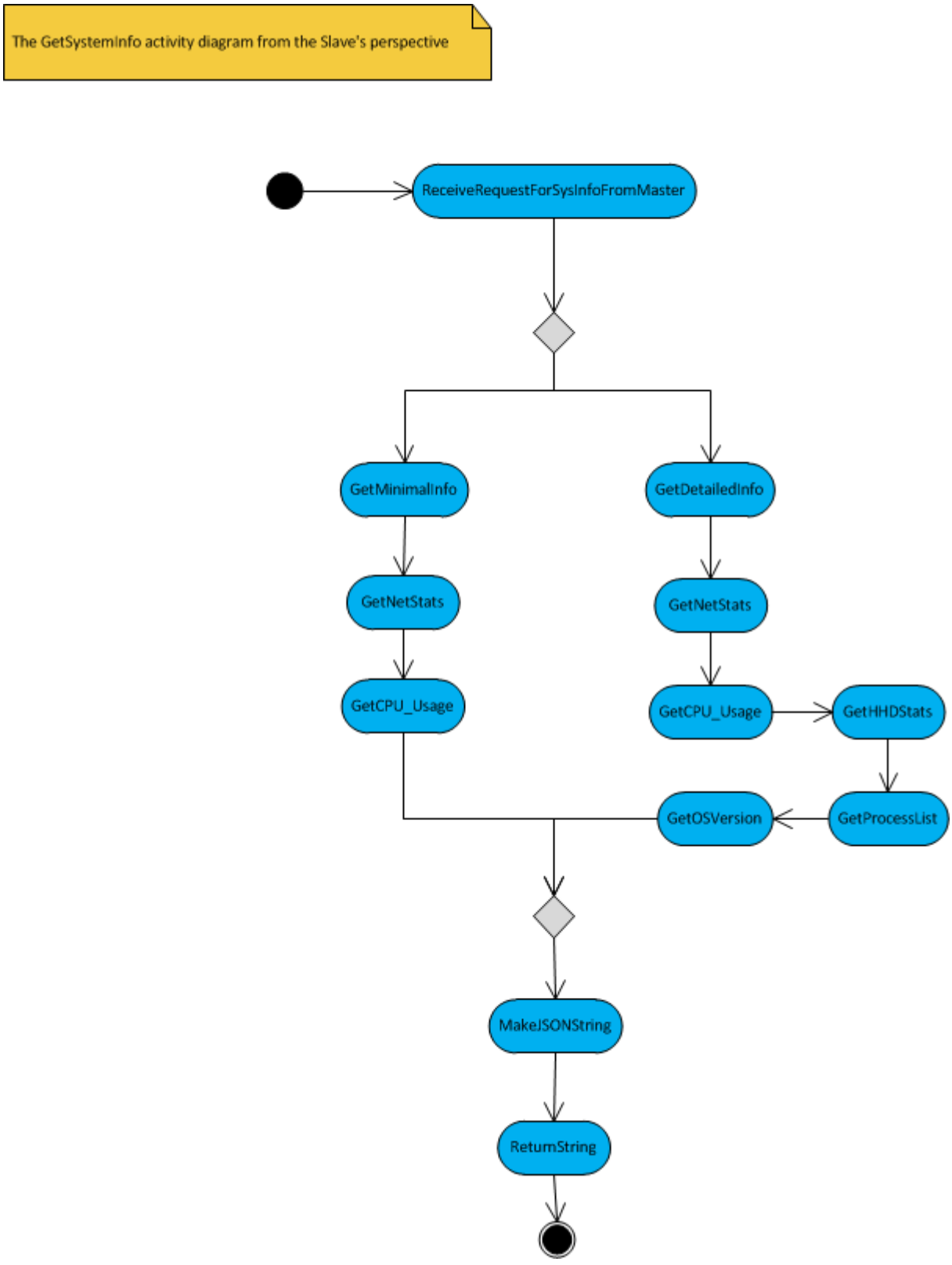
2.2 RequestSysInfo usecase

The following activity diagram is applicable to the RequestSysInfo usecase in AppMan.



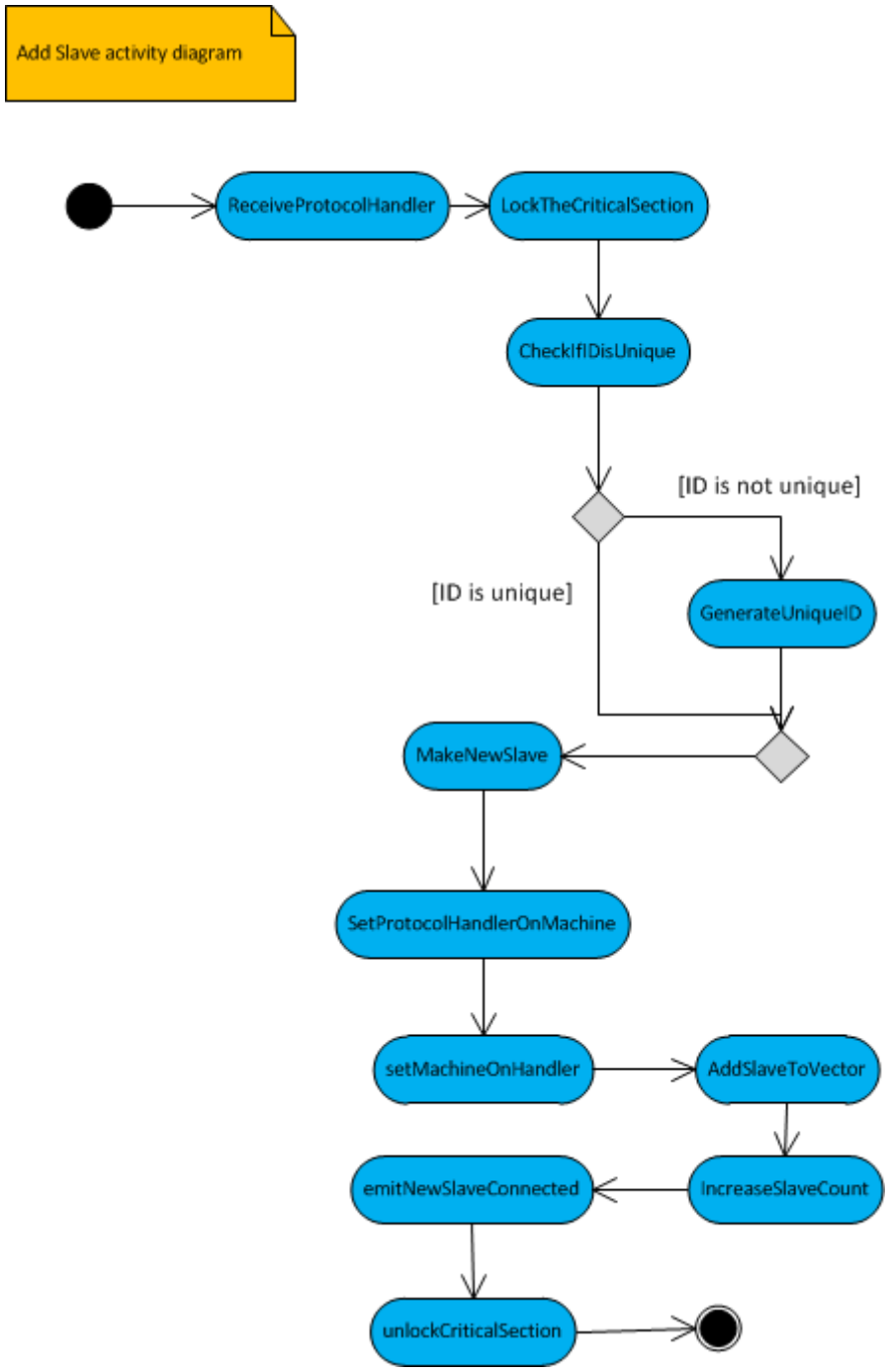
2.3 GetSysInfo usecase

The following activity diagram is applicable to the GetSysInfo usecase in AppManClient.



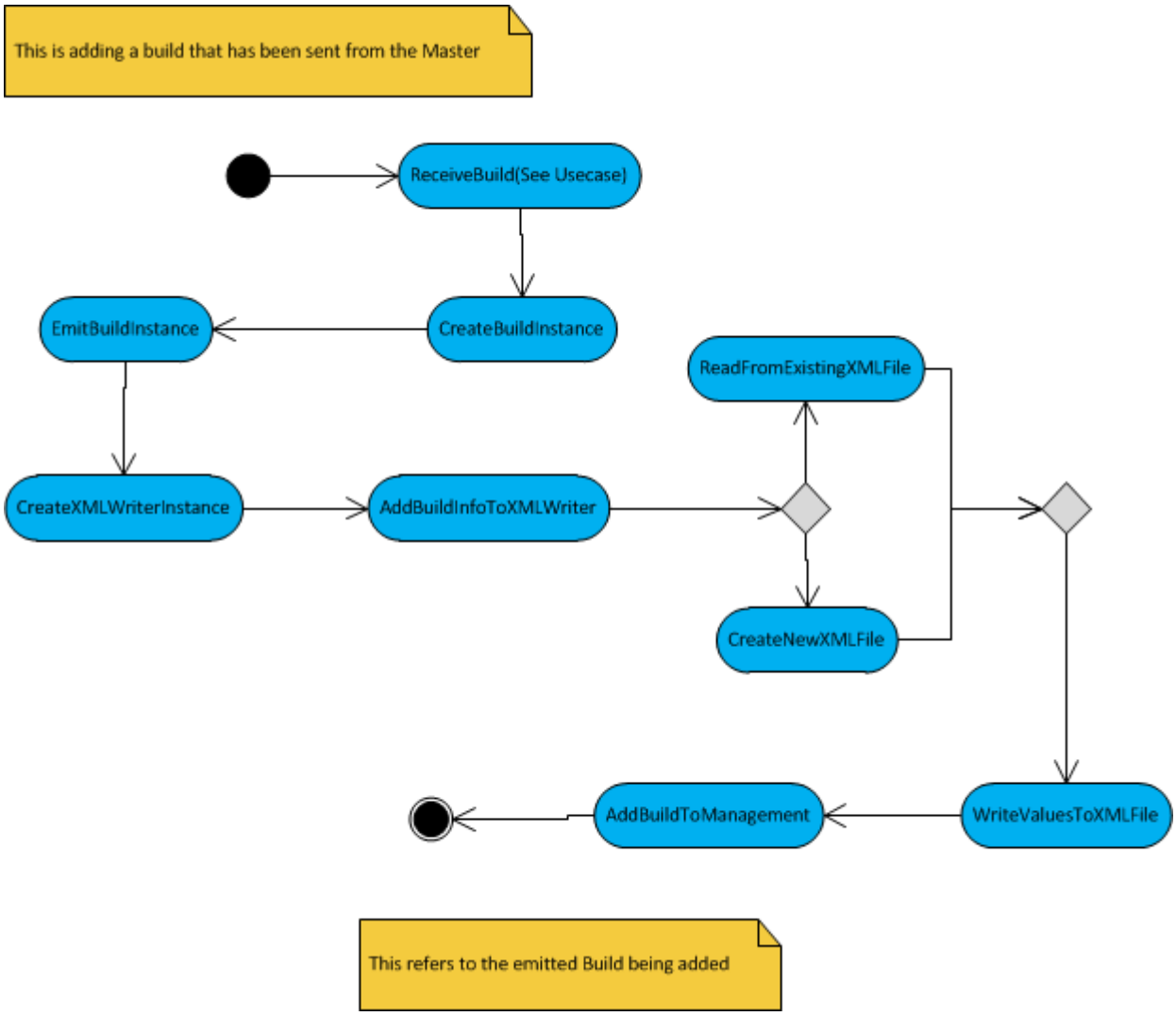
2.4 AddSlave usecase

The following activity diagram is applicable to the AddSlave usecase in AppMan.



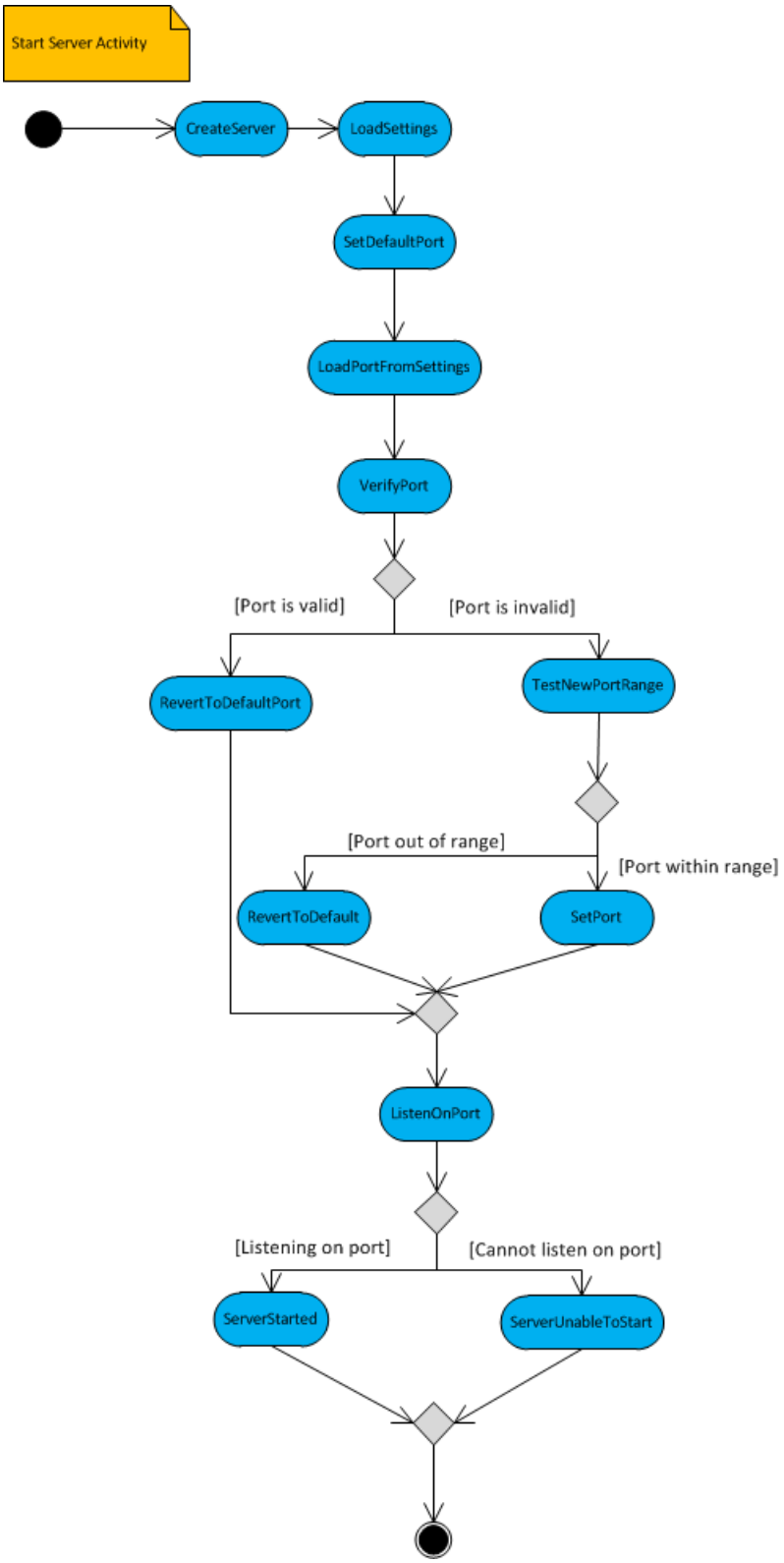
2.5 AddBuild via network usecase

The following activity diagram is applicable to the AddBuild usecase in AppManClient.



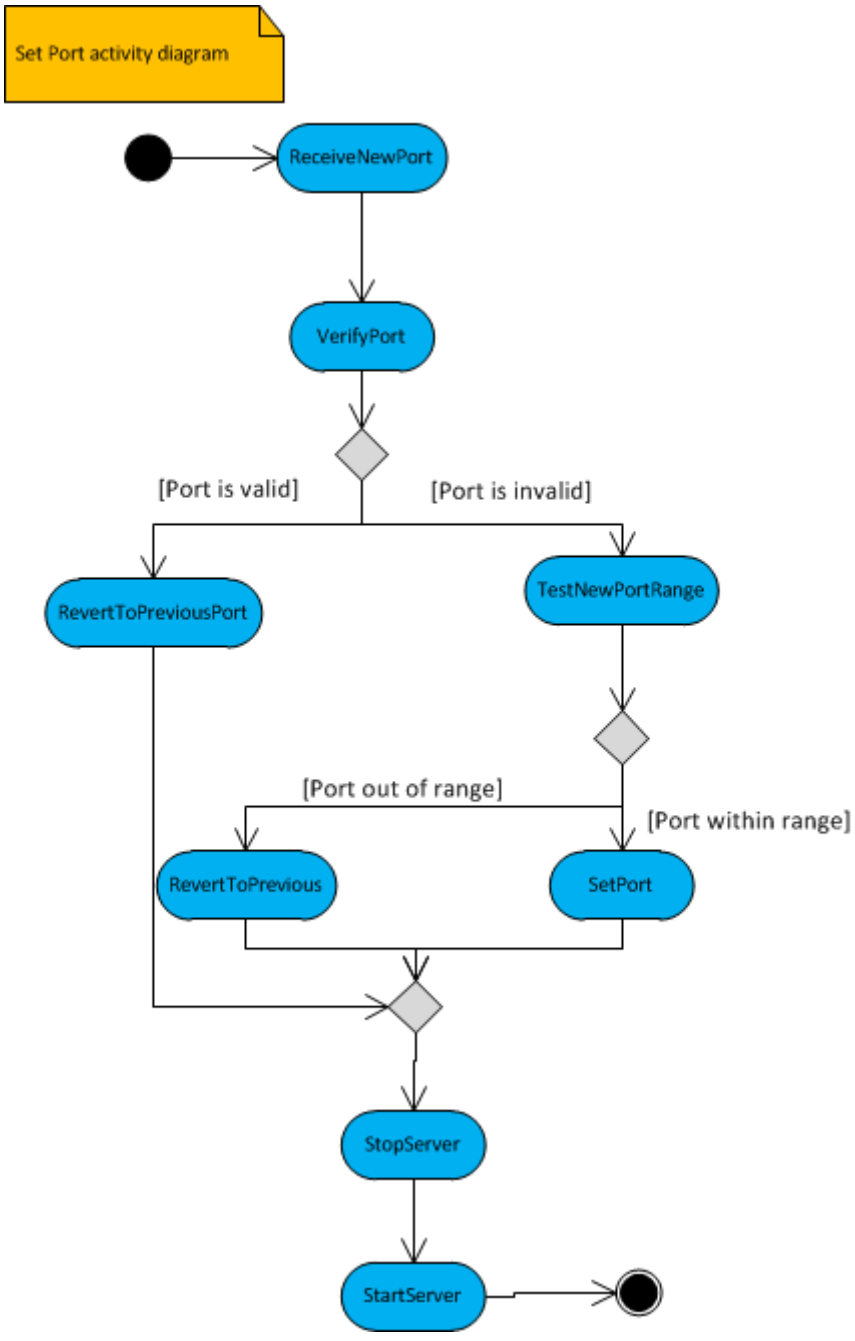
2.6 StartServer usecase

The following activity diagram is applicable to the StartServer usecase in AppMan.



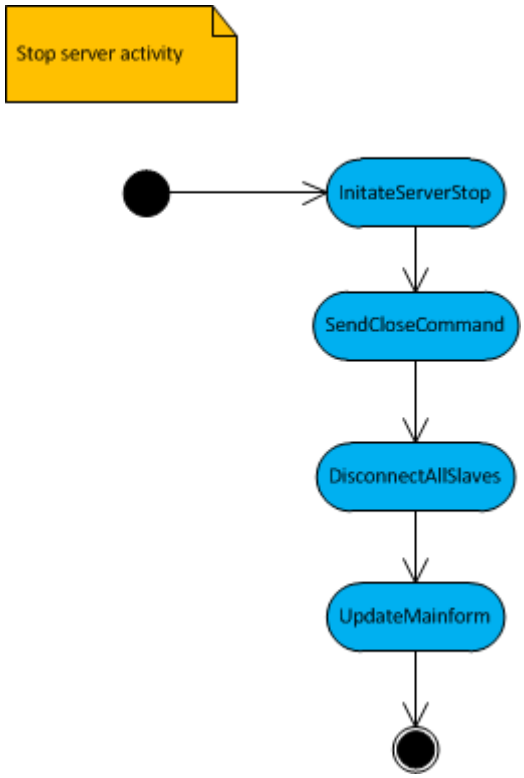
2.7 SetPort usecase

The following activity diagram is applicable to the SetPort usecase in AppMan.



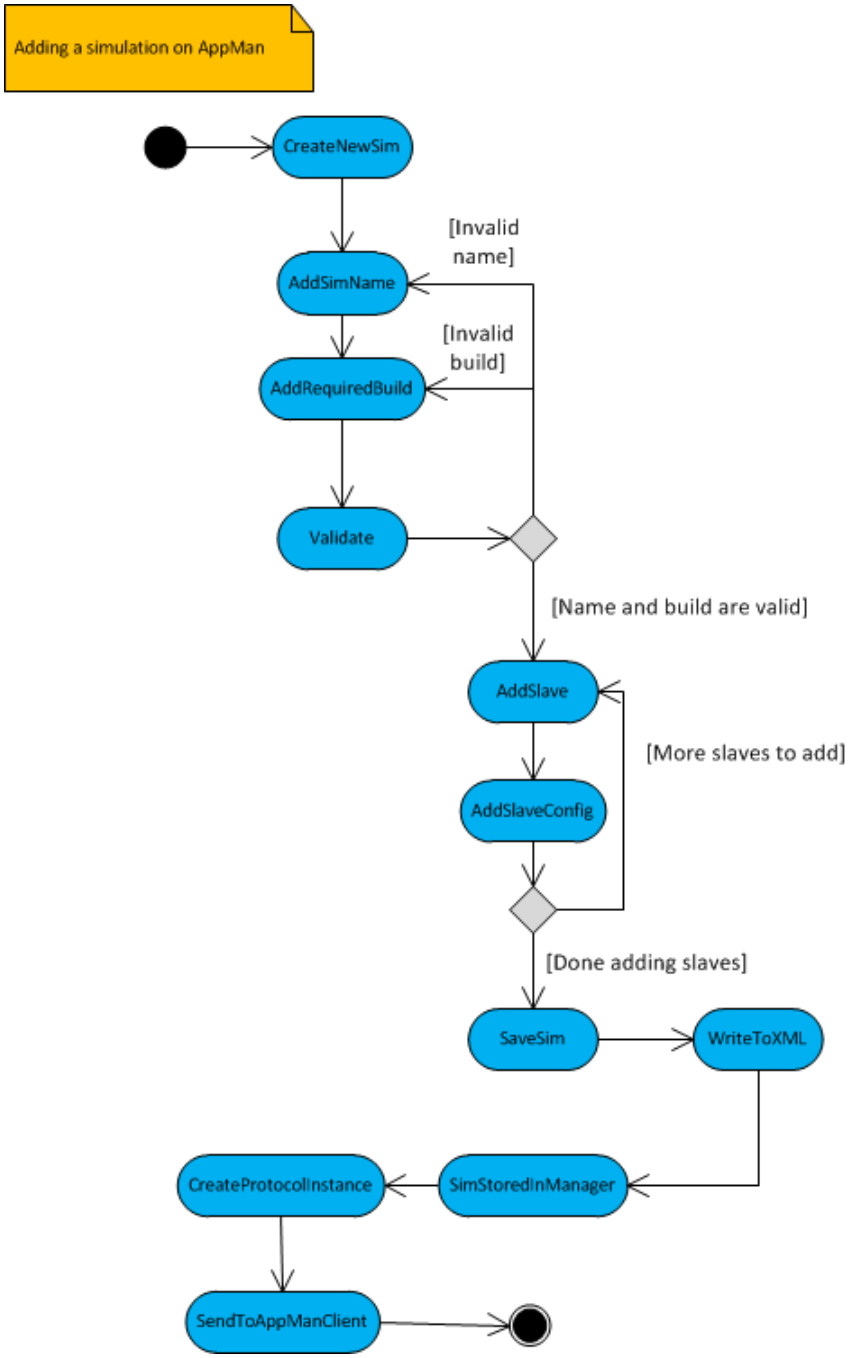
2.8 StopServer usecase

The following activity diagram is applicable to the StopServer usecase in AppMan.



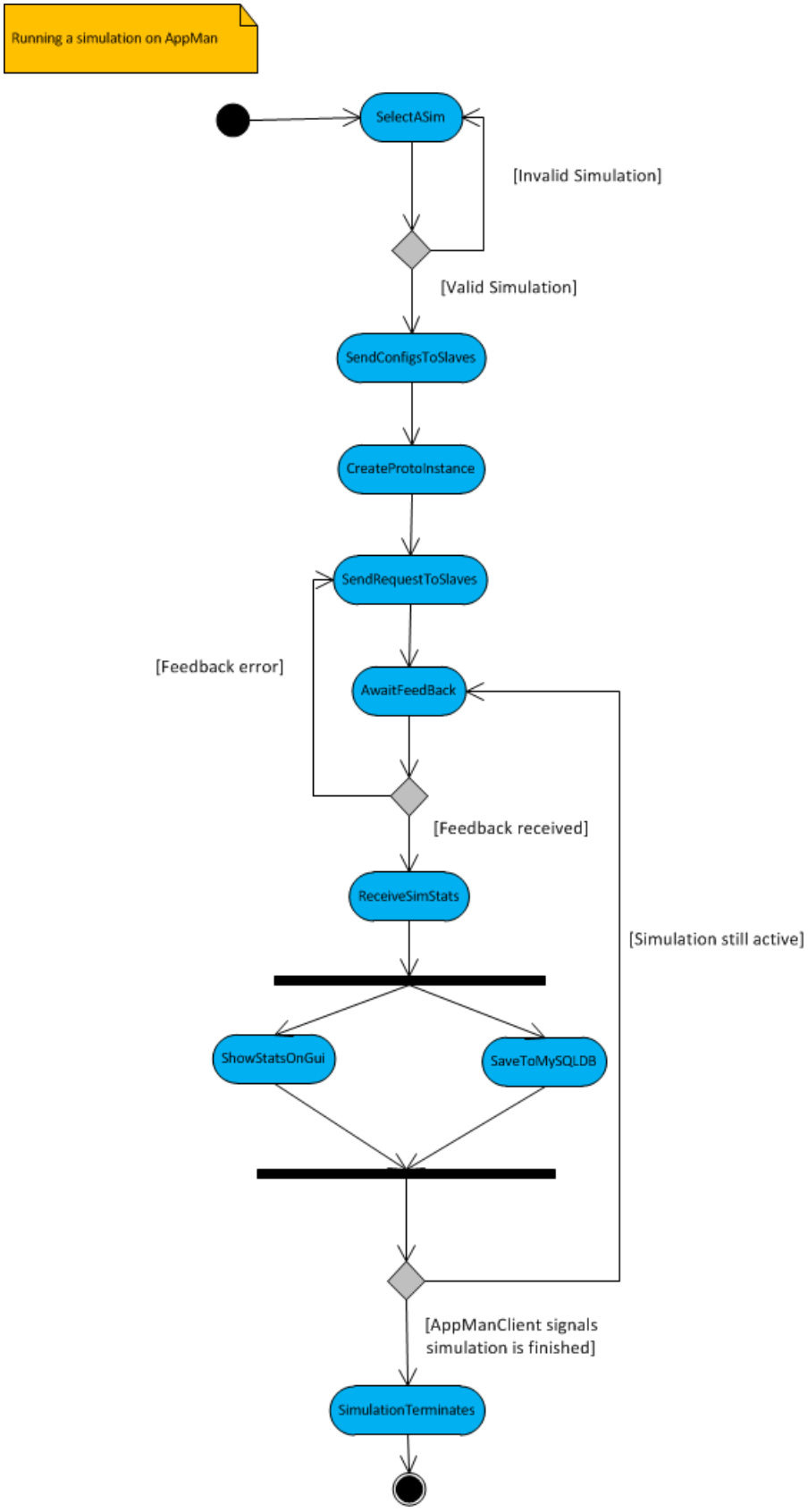
2.9 AddSimulation

A simulation must be added to AppMan in the following way:



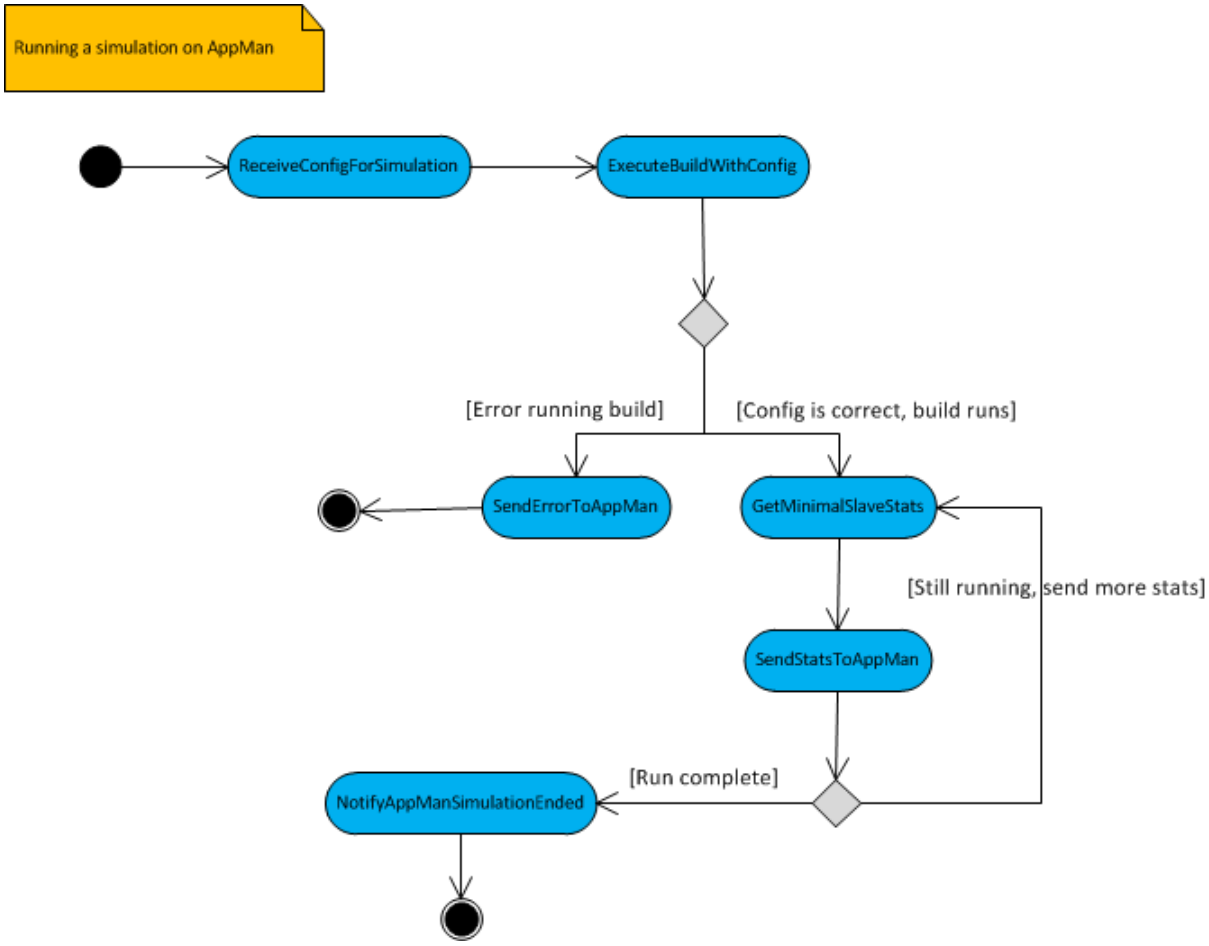
2.10 RunSimulation AppMan

A simulation is run from AppMan in the following way:



2.11 RunSimulation AppManClient

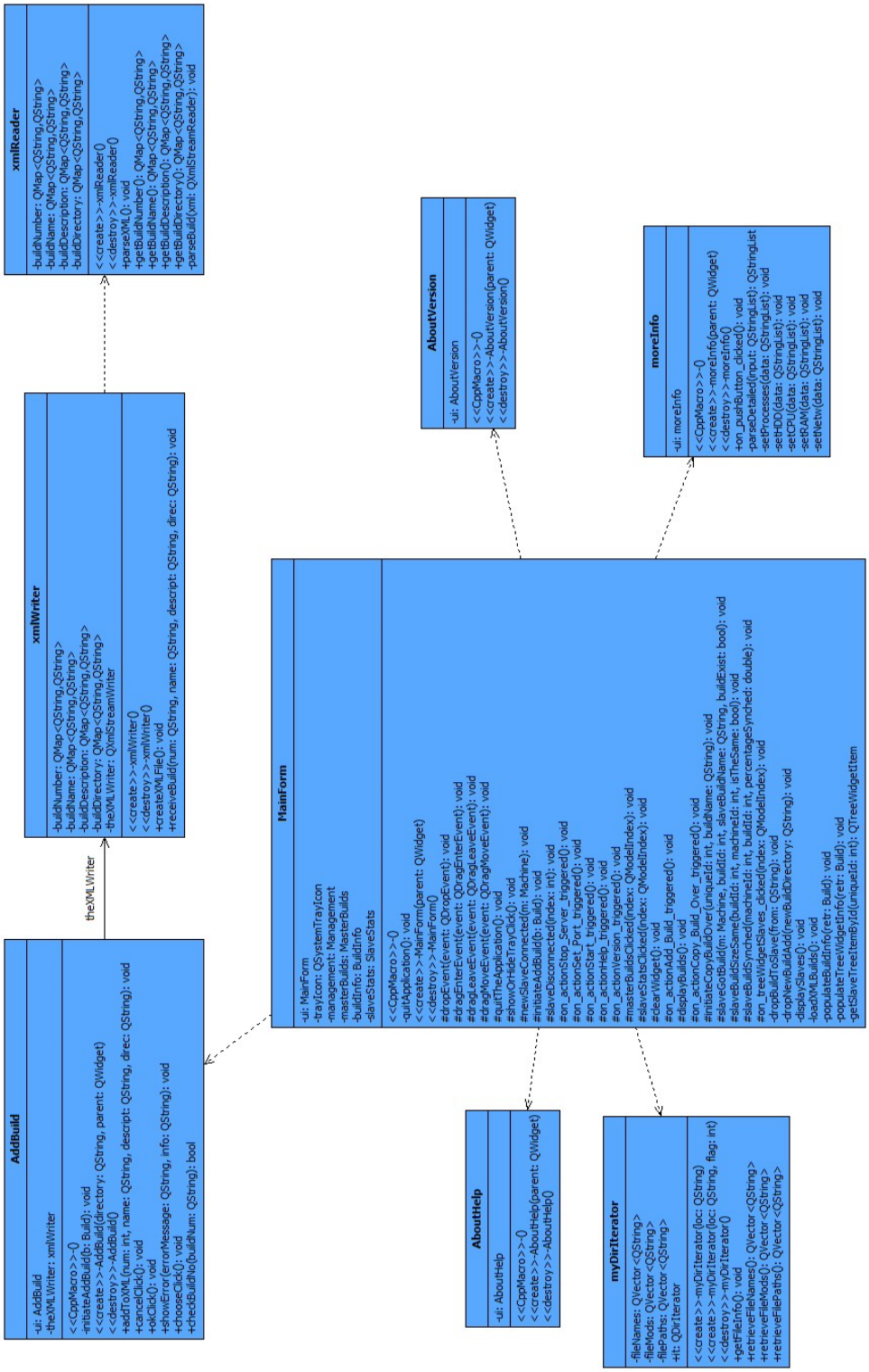
A simulation is run from AppManClient in the following way:

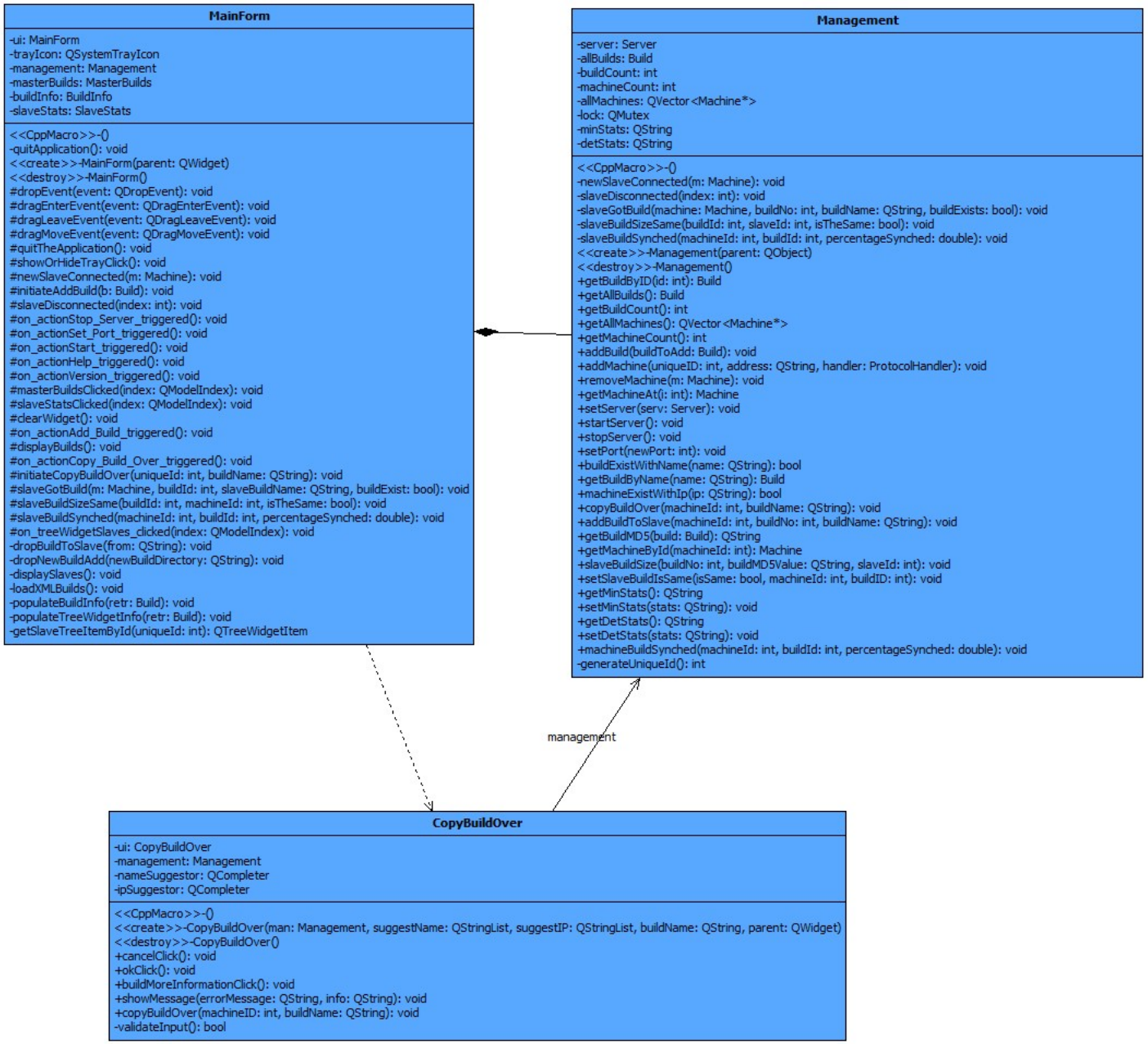


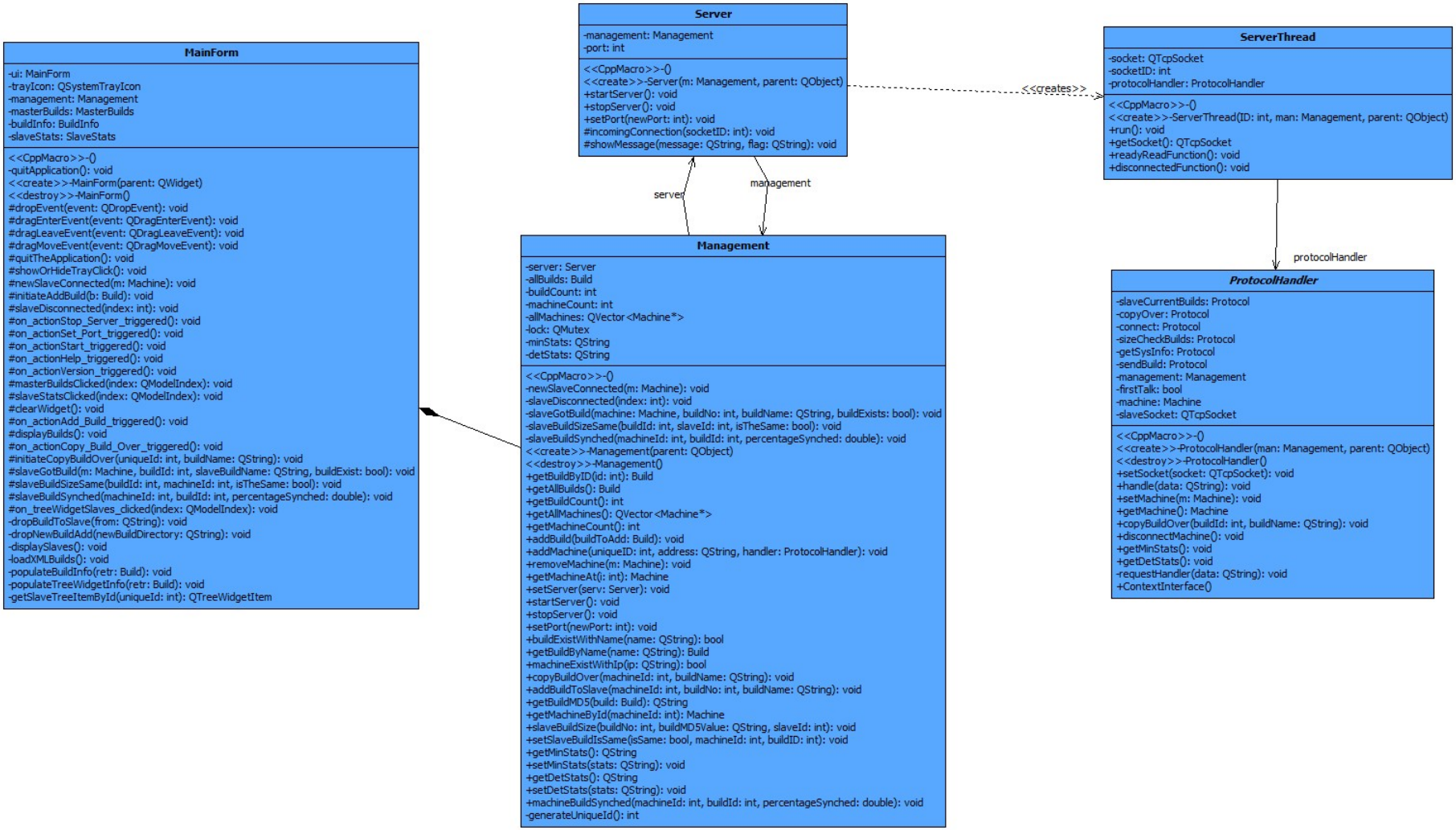
3 Class diagrams

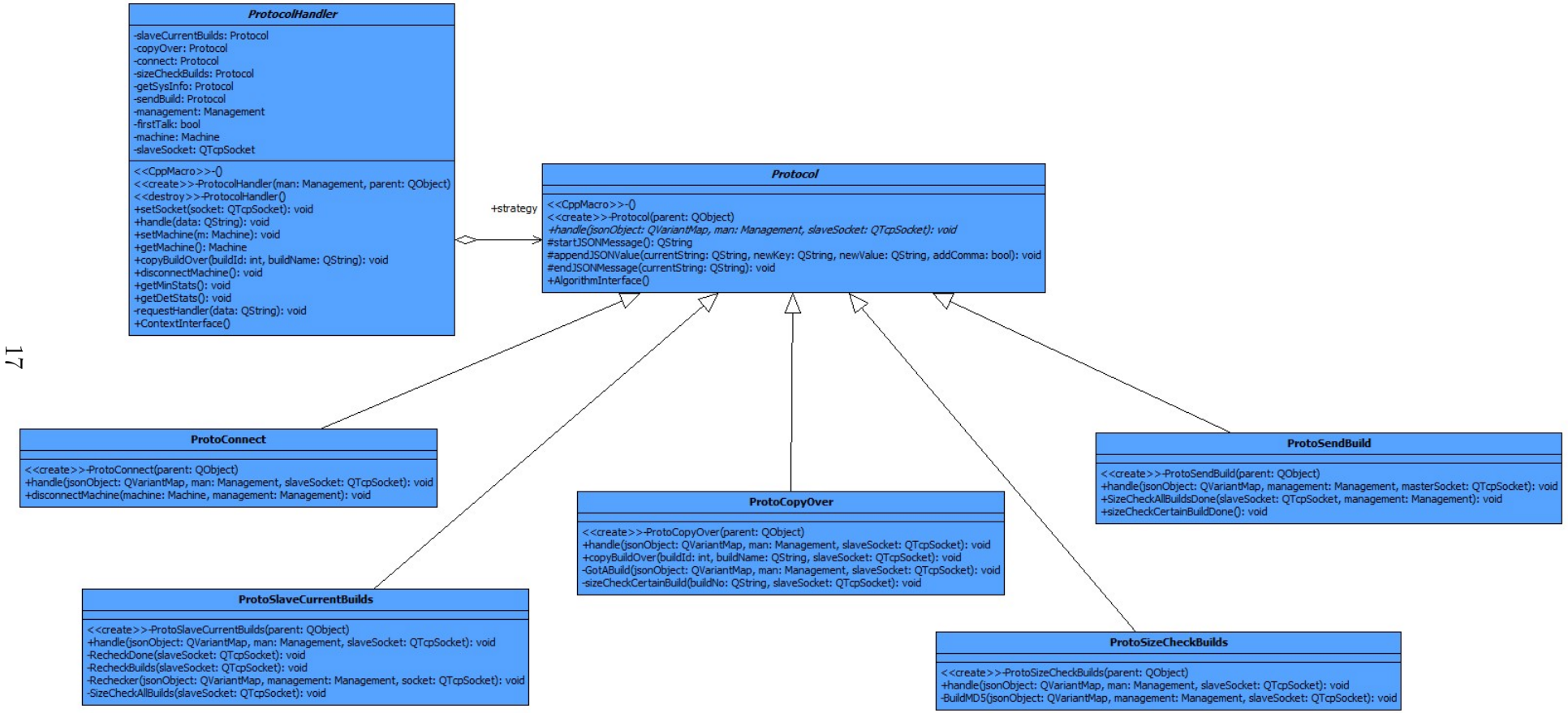
3.1 AppMan Class Diagram

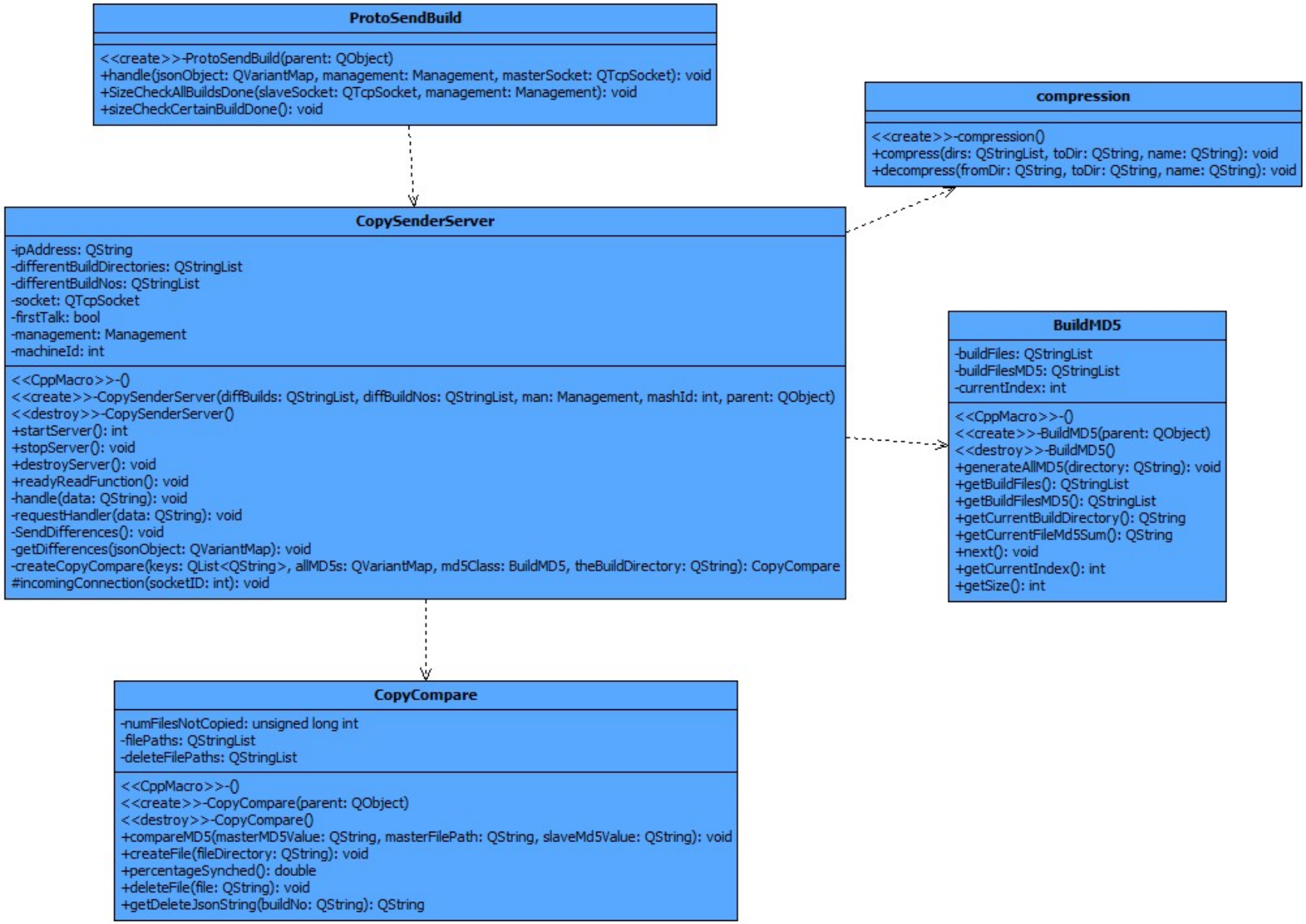
Due to its large size, the class diagram is split into multiple, seperate diagrams. Classes will be repeated to show how they all link.

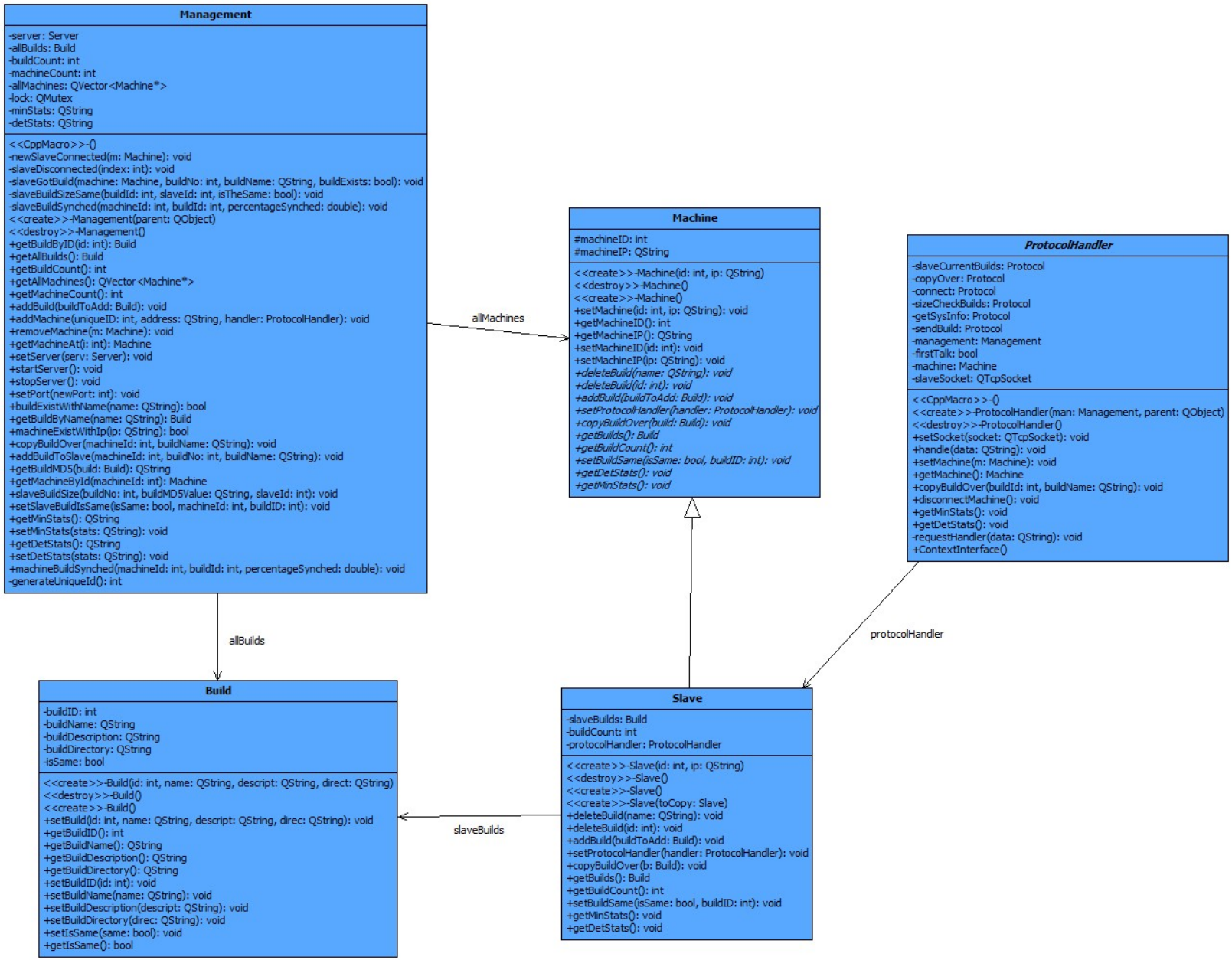



MainForm
-ui: MainForm
-trayIcon: QSystemTrayIcon
-management: Management
-masterBuilds: MasterBuilds
-buildInfo: BuildInfo
-slaveStats: SlaveStats
<<CppMacro>>-()
-quitApplication(): void
<<create>>-MainForm(parent: QWidget)
<<destroy>>-MainForm()
#dropEvent(event: QDropEvent): void
#dragEnterEvent(event: QDragEnterEvent): void
#dragLeaveEvent(event: QDragLeaveEvent): void
#dragMoveEvent(event: QDragMoveEvent): void
#quitTheApplication(): void
#showOrHideTrayClick(): void
#newSlaveConnected(m: Machine): void
#initiateAddBuild(b: Build): void
#slaveDisconnected(index: int): void
#on_actionStop_Server_triggered(): void
#on_actionSet_Port_triggered(): void
#on_actionStart_triggered(): void
#on_actionHelp_triggered(): void
#on_actionVersion_triggered(): void
#masterBuildsClicked(index: QModelIndex): void
#slaveStatsClicked(index: QModelIndex): void
#clearWidget(): void
#on_actionAdd_Build_triggered(): void
#displayBuilds(): void
#on_actionCopy_Build_Over_triggered(): void
#initiateCopyBuildOver(uniqueId: int, buildName: QString): void
#slaveGotBuild(m: Machine, buildId: int, slaveBuildName: QString, buildExist: bool): void
#slaveBuildSizeSame(buildId: int, machineId: int, isTheSame: bool): void
#slaveBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
#on_treeWidgetSlaves_clicked(index: QModelIndex): void
-dropBuildToSlave(from: QString): void
-dropNewBuildAdd(newBuildDirectory: QString): void
-displaySlaves(): void
-loadXMLBuilds(): void
-populateBuildInfo(retr: Build): void
-populateTreeWidgetInfo(retr: Build): void
-getSlaveTreeItemById(uniqueId: int): QTreeWidgetItem
Management
-server: Server
-allBuilds: Build
-buildCount: int
-machineCount: int
-allMachines: QVector<Machine*>
-lock: QMutex
-minStats: QString
-detStats: QString
<<CppMacro>>-()
-newSlaveConnected(m: Machine): void
-slaveDisconnected(index: int): void
-slaveGotBuild(machine: Machine, buildNo: int, buildName: QString, buildExists: bool): void
-slaveBuildSizeSame(buildId: int, slaveId: int, isTheSame: bool): void
-slaveBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
<<create>>-Management(parent: QObject)
<<destroy>>-Management()
+getBuildByID(id: int): Build
+getAllBuilds(): Build
+getBuildCount(): int
+getAllMachines(): QVector<Machine*>
+getMachineCount(): int
+addBuild(buildToAdd: Build): void
+addMachine(uniqueID: int, address: QString, handler: ProtocolHandler): void
+removeMachine(m: Machine): void
+getMachineAt(i: int): Machine
+setServer(serv: Server): void
+startServer(): void
+stopServer(): void
+setPort(newPort: int): void
+buildExistWithName(name: QString): bool
+getBuildByName(name: QString): Build
+machineExistWithIp(ip: QString): bool
+copyBuildOver(machineId: int, buildName: QString): void
+addBuildToSlave(machineId: int, buildNo: int, buildName: QString): void
+getBuildMD5(build: Build): QString
+getMachineById(machineId: int): Machine
+slaveBuildSize(buildNo: int, buildMD5Value: QString, slaveId: int): void
+setSlaveBuildIsSame(isSame: bool, machineId: int, buildID: int): void
+getMinStats(): QString
+setMinStats(stats: QString): void
+getDetStats(): QString
+setDetStats(stats: QString): void
+machineBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
-generateUniqueId(): int
management
CopyBuildOver
-ui: CopyBuildOver
-management: Management
-nameSuggestor: QCompleter
-ipSuggestor: QCompleter
<<CppMacro>>-()
<<create>>-CopyBuildOver(man: Management, suggestName: QStringList, suggestIP: QStringList, buildName: QString, parent: QWidget)
<<destroy>>-CopyBuildOver()
+cancelClick(): void
+okClick(): void
+buildMoreInformationClick(): void
+showMessage(errorMessage: QString, info: QString): void
+copyBuildOver(machineID: int, buildName: QString): void
-validateInput(): bool


MainForm
-ui: MainForm
-trayIcon: QSystemTrayIcon
-management: Management
-masterBuilds: MasterBuilds
-buildInfo: BuildInfo
-slaveStats: SlaveStats
<<CppMacro>>-()
-quitApplication(): void
<<create>>-MainForm(parent: QWidget)
<<destroy>>-MainForm()
#dropEvent(event: QDropEvent): void
#dragEnterEvent(event: QDragEnterEvent): void
#dragLeaveEvent(event: QDragLeaveEvent): void
#dragMoveEvent(event: QDragMoveEvent): void
#quitTheApplication(): void
#showOrHideTrayClick(): void
#newSlaveConnected(m: Machine): void
#initiateAddBuild(b: Build): void
#slaveDisconnected(index: int): void
#on_actionStop_Server_triggered(): void
#on_actionSet_Port_triggered(): void
#on_actionStart_triggered(): void
#on_actionHelp_triggered(): void
#on_actionVersion_triggered(): void
#masterBuildsClicked(index: QModelIndex): void
#slaveStatsClicked(index: QModelIndex): void
#clearWidget(): void
#on_actionAdd_Build_triggered(): void
#displayBuilds(): void
#on_actionCopy_Build_Over_triggered(): void
#initiateCopyBuildOver(uniqueId: int, buildName: QString): void
#slaveGotBuild(m: Machine, buildId: int, slaveBuildName: QString, buildExist: bool): void
#slaveBuildSizeSame(buildId: int, machineId: int, isTheSame: bool): void
#slaveBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
#on_treeWidgetSlaves_clicked(index: QModelIndex): void
-dropBuildToSlave(from: QString): void
-dropNewBuildAdd(newBuildDirectory: QString): void
-displaySlaves(): void
-loadXMLBuilds(): void
-populateBuildInfo(retr: Build): void
-populateTreeWidgetInfo(retr: Build): void
-getSlaveTreeItemById(uniqueId: int): QTreeWidgetItem
Server
-management: Management
-port: int
<<CppMacro>>-()
<<create>>-Server(m: Management, parent: QObject)
+startServer(): void
+stopServer(): void
+setPort(newPort: int): void
#incomingConnection(socketID: int): void
#showMessage(message: QString, flag: QString): void
<<creates>>
ServerThread
-socket: QTcpSocket
-socketID: int
-protocolHandler: ProtocolHandler
<<CppMacro>>-()
<<create>>-ServerThread(ID: int, man: Management, parent: QObject)
+run(): void
+getSocket(): QTcpSocket
+readyReadFunction(): void
+disconnectedFunction(): void
server
management
protocolHandler
Management
-server: Server
-allBuilds: Build
-buildCount: int
-machineCount: int
-allMachines: QVector<Machine*>
-lock: QMutex
-minStats: QString
-detStats: QString
<<CppMacro>>-()
-newSlaveConnected(m: Machine): void
-slaveDisconnected(index: int): void
-slaveGotBuild(machine: Machine, buildNo: int, buildName: QString, buildExists: bool): void
-slaveBuildSizeSame(buildId: int, slaveId: int, isTheSame: bool): void
-slaveBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
<<create>>-Management(parent: QObject)
<<destroy>>-Management()
+getBuildByID(id: int): Build
+getAllBuilds(): Build
+getBuildCount(): int
+getAllMachines(): QVector<Machine*>
+getMachineCount(): int
+addBuild(buildToAdd: Build): void
+addMachine(uniqueID: int, address: QString, handler: ProtocolHandler): void
+removeMachine(m: Machine): void
+getMachineAt(i: int): Machine
+setServer(serv: Server): void
+startServer(): void
+stopServer(): void
+setPort(newPort: int): void
+buildExistWithName(name: QString): bool
+getBuildByName(name: QString): Build
+machineExistWithIp(ip: QString): bool
+copyBuildOver(machineId: int, buildName: QString): void
+addBuildToSlave(machineId: int, buildNo: int, buildName: QString): void
+getBuildMD5(build: Build): QString
+getMachineById(machineId: int): Machine
+slaveBuildSize(buildNo: int, buildMD5Value: QString, slaveId: int): void
+setSlaveBuildIsSame(isSame: bool, machineId: int, buildID: int): void
+getMinStats(): QString
+setMinStats(stats: QString): void
+getDetStats(): QString
+setDetStats(stats: QString): void
+machineBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
-generateUniqueId(): int
ProtocolHandler
-slaveCurrentBuilds: Protocol
-copyOver: Protocol
-connect: Protocol
-sizeCheckBuilds: Protocol
-getSysInfo: Protocol
-sendBuild: Protocol
-management: Management
-firstTalk: bool
-machine: Machine
-slaveSocket: QTcpSocket
<<CppMacro>>-()
<<create>>-ProtocolHandler(man: Management, parent: QObject)
<<destroy>>-ProtocolHandler()
+setSocket(socket: QTcpSocket): void
+handle(data: QString): void
+setMachine(m: Machine): void
+getMachine(): Machine
+copyBuildOver(buildId: int, buildName: QString): void
+disconnectMachine(): void
+getMinStats(): void
+getDetStats(): void
-requestHandler(data: QString): void
+ContextInterface()

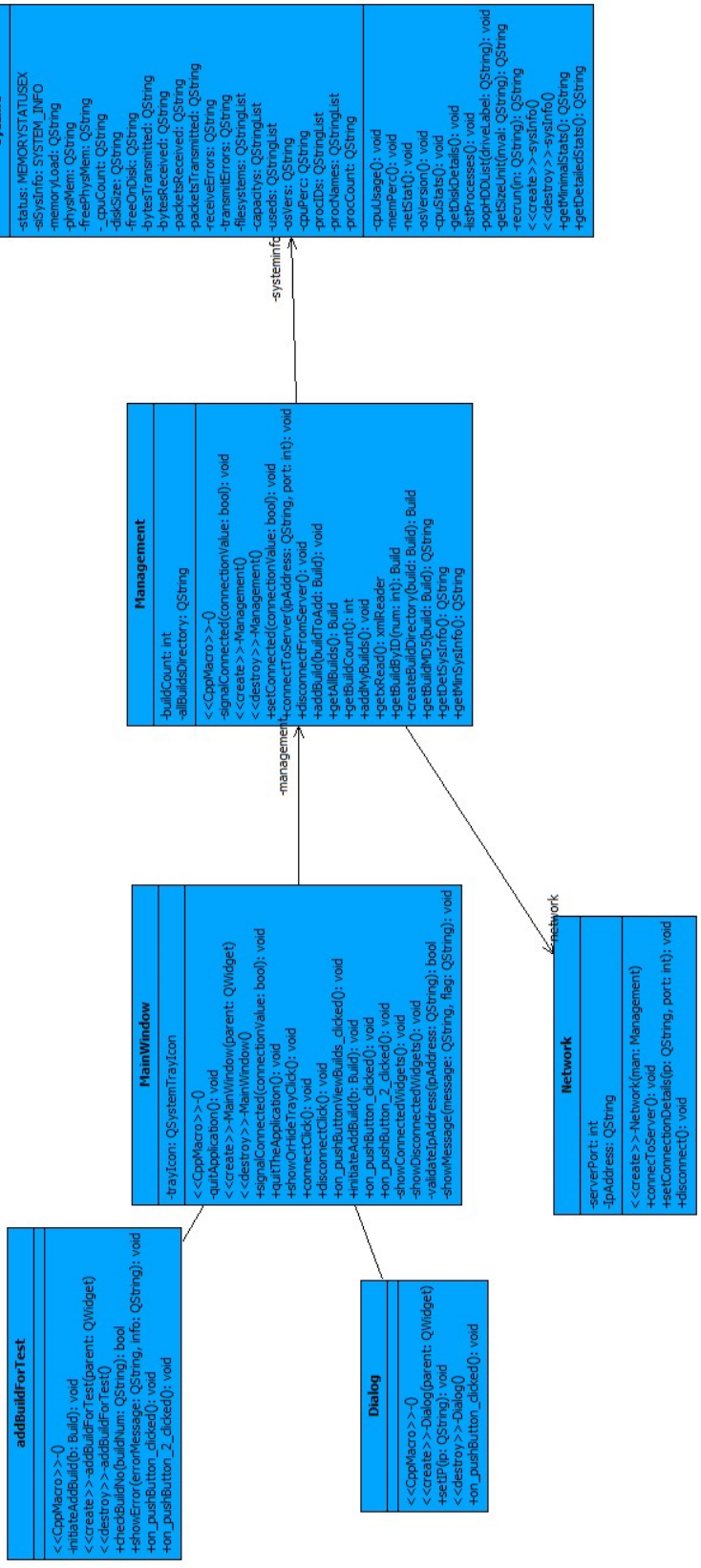

ProtocolHandler
-slaveCurrentBuilds: Protocol
-copyOver: Protocol
-connect: Protocol
-sizeCheckBuilds: Protocol
-getSysInfo: Protocol
-sendBuild: Protocol
-management: Management
-firstTalk: bool
-machine: Machine
-slaveSocket: QTcpSocket
<<CppMacro>>-()
<<create>>-ProtocolHandler(man: Management, parent: QObject)
<<destroy>>-ProtocolHandler()
+setSocket(socket: QTcpSocket): void
+handle(data: QString): void
+setMachine(m: Machine): void
+getMachine(): Machine
+copyBuildOver(buildId: int, buildName: QString): void
+disconnectMachine(): void
+getMinStats(): void
+getDetStats(): void
-requestHandler(data: QString): void
+ContextInterface()
+strategy
Protocol
<<CppMacro>>-()
<<create>>-Protocol(parent: QObject)
+handle(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
#startJSONMessage(): QString
#appendJSONValue(currentString: QString, newKey: QString, newValue: QString, addComma: bool): void
#endJSONMessage(currentString: QString): void
+AlgorithmInterface()
ProtoConnect
<<create>>-ProtoConnect(parent: QObject)
+handle(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
+disconnectMachine(machine: Machine, management: Management): void
ProtoCopyOver
<<create>>-ProtoCopyOver(parent: QObject)
+handle(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
+copyBuildOver(buildId: int, buildName: QString, slaveSocket: QTcpSocket): void
-GotABuild(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
-sizeCheckCertainBuild(buildNo: QString, slaveSocket: QTcpSocket): void
ProtoSendBuild
<<create>>-ProtoSendBuild(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
+SizeCheckAllBuildsDone(slaveSocket: QTcpSocket, management: Management): void
+sizeCheckCertainBuildDone(): void
ProtoSlaveCurrentBuilds
<<create>>-ProtoSlaveCurrentBuilds(parent: QObject)
+handle(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
-RecheckDone(slaveSocket: QTcpSocket): void
-RecheckBuilds(slaveSocket: QTcpSocket): void
-Rechecker(jsonObject: QVariantMap, management: Management, socket: QTcpSocket): void
-SizeCheckAllBuilds(slaveSocket: QTcpSocket): void
ProtoSizeCheckBuilds
<<create>>-ProtoSizeCheckBuilds(parent: QObject)
+handle(jsonObject: QVariantMap, man: Management, slaveSocket: QTcpSocket): void
-BuildMD5(jsonObject: QVariantMap, management: Management, slaveSocket: QTcpSocket): void

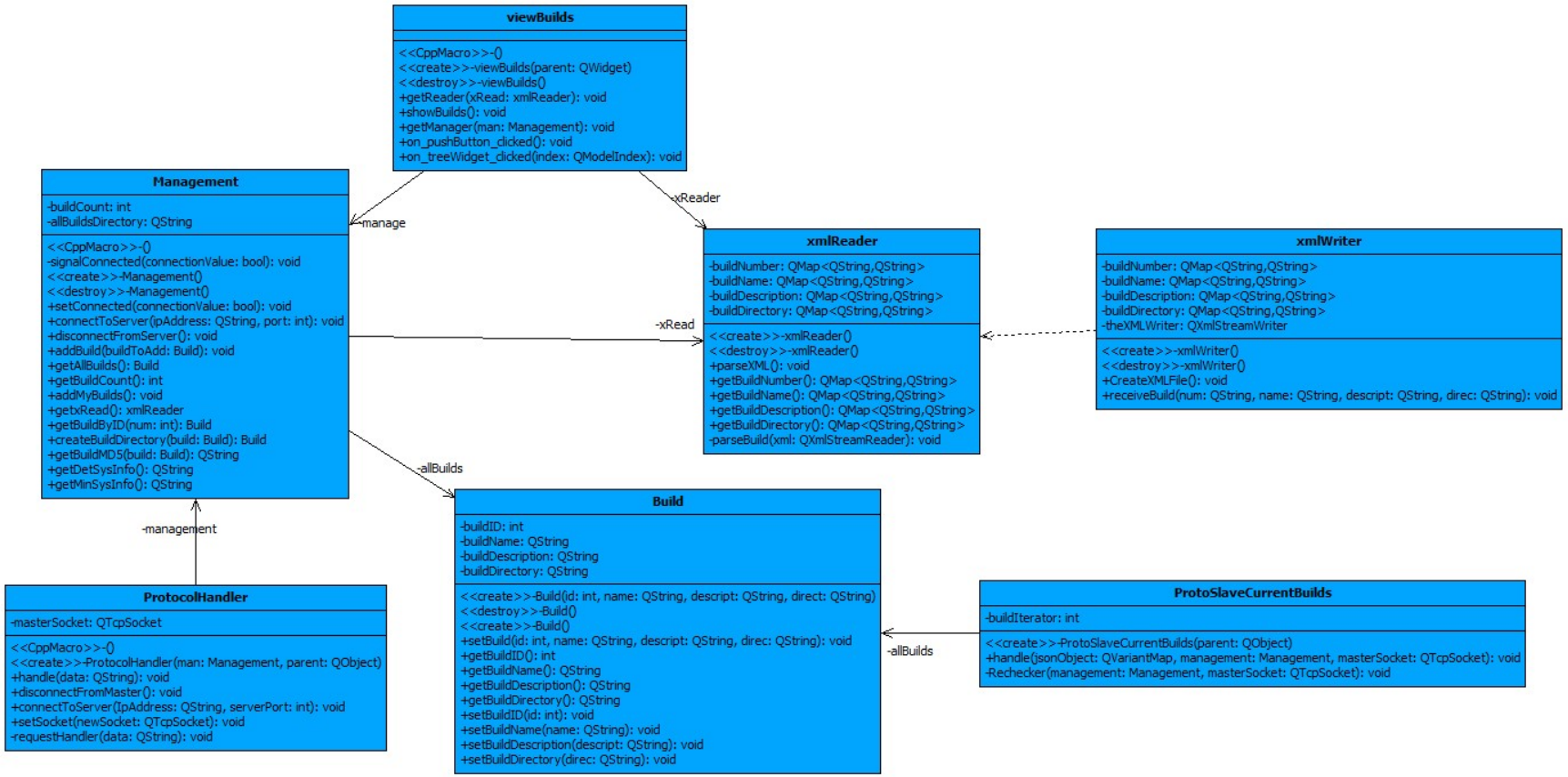

ProtoSendBuild
<<create>>-ProtoSendBuild(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
+SizeCheckAllBuildsDone(slaveSocket: QTcpSocket, management: Management): void
+sizeCheckCertainBuildDone(): void
compression
<<create>>-compression()
+compress(dirs: QStringList, toDir: QString, name: QString): void
+decompress(fromDir: QString, toDir: QString, name: QString): void
CopySenderServer
-ipAddress: QString
-differentBuildDirectories: QStringList
-differentBuildNos: QStringList
-socket: QTcpSocket
-firstTalk: bool
-management: Management
-machineId: int
<<CppMacro>>-()
<<create>>-CopySenderServer(diffBuilds: QStringList, diffBuildNos: QStringList, man: Management, mashId: int, parent: QObject)
<<destroy>>-CopySenderServer()
+startServer(): int
+stopServer(): void
+destroyServer(): void
+readyReadFunction(): void
-handle(data: QString): void
-requestHandler(data: QString): void
-SendDifferences(): void
-getDifferences(jsonObject: QVariantMap): void
-createCopyCompare(keys: QList<QString>, allMD5s: QVariantMap, md5Class: BuildMD5, theBuildDirectory: QString): CopyCompare
#incomingConnection(socketID: int): void
BuildMD5
-buildFiles: QStringList
-buildFilesMD5: QStringList
-currentIndex: int
<<CppMacro>>-()
<<create>>-BuildMD5(parent: QObject)
<<destroy>>-BuildMD5()
+generateAllMD5(directory: QString): void
+getBuildFiles(): QStringList
+getBuildFilesMD5(): QStringList
+getCurrentBuildDirectory(): QString
+getCurrentFileMd5Sum(): QString
+next(): void
+getCurrentIndex(): int
+getSize(): int
CopyCompare
-numFilesNotCopied: unsigned long int
-filePaths: QStringList
-deleteFilePaths: QStringList
<<CppMacro>>-()
<<create>>-CopyCompare(parent: QObject)
<<destroy>>-CopyCompare()
+compareMD5(masterMD5Value: QString, masterFilePath: QString, slaveMd5Value: QString): void
+createFile(fileDirectory: QString): void
+percentageSynched(): double
+deleteFile(file: QString): void
+getDeleteJsonString(buildNo: QString): QString

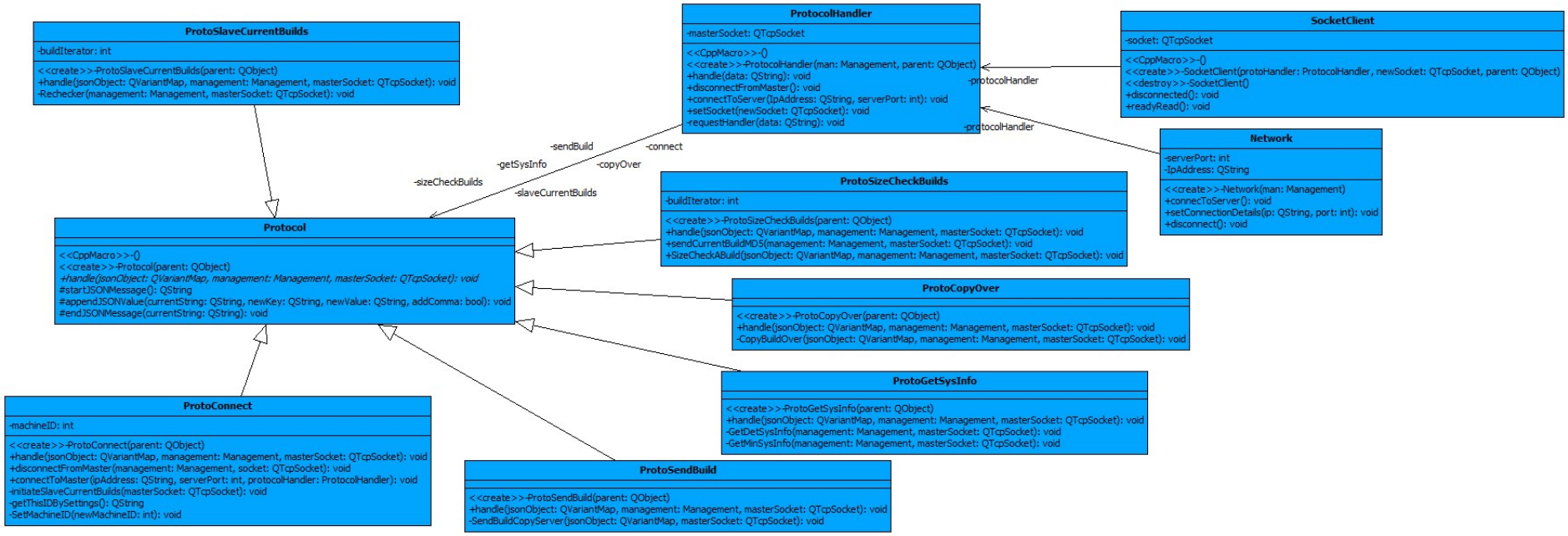

Management
-server: Server
-allBuilds: Build
-buildCount: int
-machineCount: int
-allMachines: QVector<Machine*>
-lock: QMutex
-minStats: QString
-detStats: QString
<<CppMacro>>-()
-newSlaveConnected(m: Machine): void
-slaveDisconnected(index: int): void
-slaveGotBuild(machine: Machine, buildNo: int, buildName: QString, buildExists: bool): void
-slaveBuildSizeSame(buildId: int, slaveId: int, isTheSame: bool): void
-slaveBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
<<create>>-Management(parent: QObject)
<<destroy>>-Management()
+getBuildByID(id: int): Build
+getAllBuilds(): Build
+getBuildCount(): int
+getAllMachines(): QVector<Machine*>
+getMachineCount(): int
+addBuild(buildToAdd: Build): void
+addMachine(uniqueID: int, address: QString, handler: ProtocolHandler): void
+removeMachine(m: Machine): void
+getMachineAt(i: int): Machine
+setServer(serv: Server): void
+startServer(): void
+stopServer(): void
+setPort(newPort: int): void
+buildExistWithName(name: QString): bool
+getBuildByName(name: QString): Build
+machineExistWithIp(ip: QString): bool
+copyBuildOver(machineId: int, buildName: QString): void
+addBuildToSlave(machineId: int, buildNo: int, buildName: QString): void
+getBuildMD5(build: Build): QString
+getMachineById(machineId: int): Machine
+slaveBuildSize(buildNo: int, buildMD5Value: QString, slaveId: int): void
+setSlaveBuildIsSame(isSame: bool, machineId: int, buildID: int): void
+getMinStats(): QString
+setMinStats(stats: QString): void
+getDetStats(): QString
+setDetStats(stats: QString): void
+machineBuildSynched(machineId: int, buildId: int, percentageSynched: double): void
-generateUniqueId(): int
allMachines
Machine
#machineID: int
#machineIP: QString
<<create>>-Machine(id: int, ip: QString)
<<destroy>>-Machine()
<<create>>-Machine()
+setMachine(id: int, ip: QString): void
+getMachineID(): int
+getMachineIP(): QString
+setMachineID(id: int): void
+setMachineIP(ip: QString): void
+deleteBuild(name: QString): void
+deleteBuild(id: int): void
+addBuild(buildToAdd: Build): void
+setProtocolHandler(handler: ProtocolHandler): void
+copyBuildOver(build: Build): void
+getBuilds(): Build
+getBuildCount(): int
+setBuildSame(isSame: bool, buildID: int): void
+getDetStats(): void
+getMinStats(): void
ProtocolHandler
-slaveCurrentBuilds: Protocol
-copyOver: Protocol
-connect: Protocol
-sizeCheckBuilds: Protocol
-getSysInfo: Protocol
-sendBuild: Protocol
-management: Management
-firstTalk: bool
-machine: Machine
-slaveSocket: QTcpSocket
<<CppMacro>>-()
<<create>>-ProtocolHandler(man: Management, parent: QObject)
<<destroy>>-ProtocolHandler()
+setSocket(socket: QTcpSocket): void
+handle(data: QString): void
+setMachine(m: Machine): void
+getMachine(): Machine
+copyBuildOver(buildId: int, buildName: QString): void
+disconnectMachine(): void
+getMinStats(): void
+getDetStats(): void
-requestHandler(data: QString): void
+ContextInterface()
allBuilds
protocolHandler
Build
-buildID: int
-buildName: QString
-buildDescription: QString
-buildDirectory: QString
-isSame: bool
<<create>>-Build(id: int, name: QString, descript: QString, direct: QString)
<<destroy>>-Build()
<<create>>-Build()
+setBuild(id: int, name: QString, descript: QString, direc: QString): void
+getBuildID(): int
+getBuildName(): QString
+getBuildDescription(): QString
+getBuildDirectory(): QString
+setBuildID(id: int): void
+setBuildName(name: QString): void
+setBuildDescription(descript: QString): void
+setBuildDirectory(direc: QString): void
+setIsSame(same: bool): void
+getIsSame(): bool
slaveBuilds
Slave
-slaveBuilds: Build
-buildCount: int
-protocolHandler: ProtocolHandler
<<create>>-Slave(id: int, ip: QString)
<<destroy>>-Slave()
<<create>>-Slave()
<<create>>-Slave(toCopy: Slave)
+deleteBuild(name: QString): void
+deleteBuild(id: int): void
+addBuild(buildToAdd: Build): void
+setProtocolHandler(handler: ProtocolHandler): void
+copyBuildOver(b: Build): void
+getBuilds(): Build
+getBuildCount(): int
+setBuildSame(isSame: bool, buildID: int): void
+getMinStats(): void
+getDetStats(): void

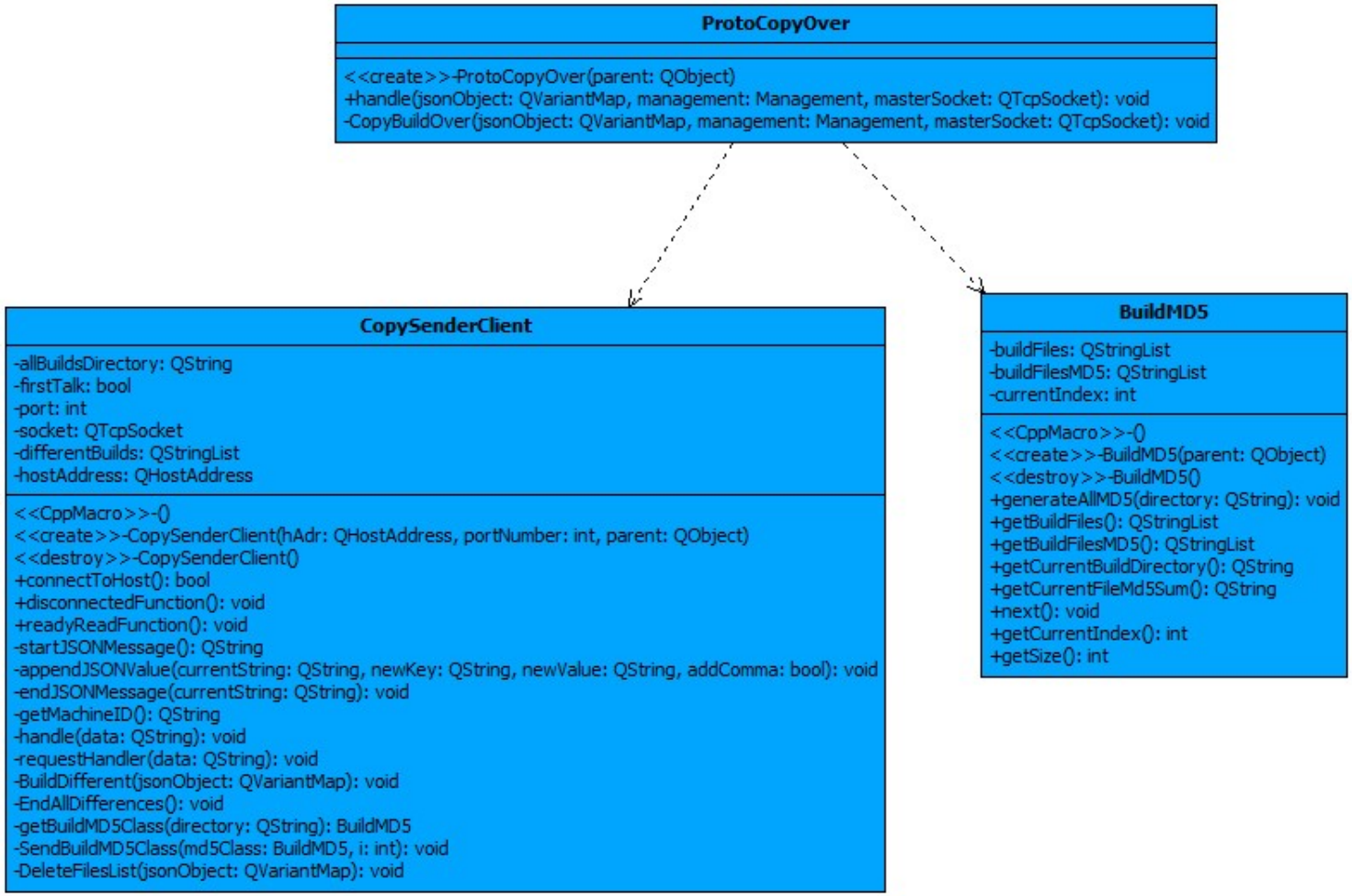
3.2 AppManClient Class Diagram

Due to its large size, the class diagram is split into multiple, seperate diagrams. Classes will be repeated to show how they all link.




viewBuilds
<<CppMacro>>-()
<<create>>-viewBuilds(parent: QWidget)
<<destroy>>-viewBuilds()
+getReader(xRead: xmlReader): void
+showBuilds(): void
+getManager(man: Management): void
+on_pushButton_clicked(): void
+on_treeWidget_clicked(index: QModelIndex): void
Management
-buildCount: int
-allBuildsDirectory: QString
<<CppMacro>>-()
-signalConnected(connectionValue: bool): void
<<create>>-Management()
<<destroy>>-Management()
+setConnected(connectionValue: bool): void
+connectToServer(ipAddress: QString, port: int): void
+disconnectFromServer(): void
+addBuild(buildToAdd: Build): void
+getAllBuilds(): Build
+getBuildCount(): int
+addMyBuilds(): void
+getxRead(): xmlReader
+getBuildByID(num: int): Build
+createBuildDirectory(build: Build): Build
+getBuildMD5(build: Build): QString
+getDetSysInfo(): QString
+getMinSysInfo(): QString
manage
xReader
xmlReader
-buildNumber: QMap<QString,QString>
-buildName: QMap<QString,QString>
-buildDescription: QMap<QString,QString>
-buildDirectory: QMap<QString,QString>
<<create>>-xmlReader()
<<destroy>>-xmlReader()
+parseXML(): void
+getBuildNumber(): QMap<QString,QString>
+getBuildName(): QMap<QString,QString>
+getBuildDescription(): QMap<QString,QString>
+getBuildDirectory(): QMap<QString,QString>
-parseBuild(xml: QXmlStreamReader): void
xmlWriter
-buildNumber: QMap<QString,QString>
-buildName: QMap<QString,QString>
-buildDescription: QMap<QString,QString>
-buildDirectory: QMap<QString,QString>
-theXMLWriter: QXmlStreamWriter
<<create>>-xmlWriter()
<<destroy>>-xmlWriter()
+CreateXMLFile(): void
+receiveBuild(num: QString, name: QString, descript: QString, direc: QString): void
-xRead
-allBuilds
-management
ProtocolHandler
-masterSocket: QTcpSocket
<<CppMacro>>-()
<<create>>-ProtocolHandler(man: Management, parent: QObject)
+handle(data: QString): void
+disconnectFromMaster(): void
+connectToServer(IpAddress: QString, serverPort: int): void
+setSocket(newSocket: QTcpSocket): void
-requestHandler(data: QString): void
Build
-buildID: int
-buildName: QString
-buildDescription: QString
-buildDirectory: QString
<<create>>-Build(id: int, name: QString, descript: QString, direct: QString)
<<destroy>>-Build()
<<create>>-Build()
+setBuild(id: int, name: QString, descript: QString, direc: QString): void
+getBuildID(): int
+getBuildName(): QString
+getBuildDescription(): QString
+getBuildDirectory(): QString
+setBuildID(id: int): void
+setBuildName(name: QString): void
+setBuildDescription(descript: QString): void
+setBuildDirectory(direc: QString): void
ProtoSlaveCurrentBuilds
-buildIterator: int
<<create>>-ProtoSlaveCurrentBuilds(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-Rechecker(management: Management, masterSocket: QTcpSocket): void
-allBuilds

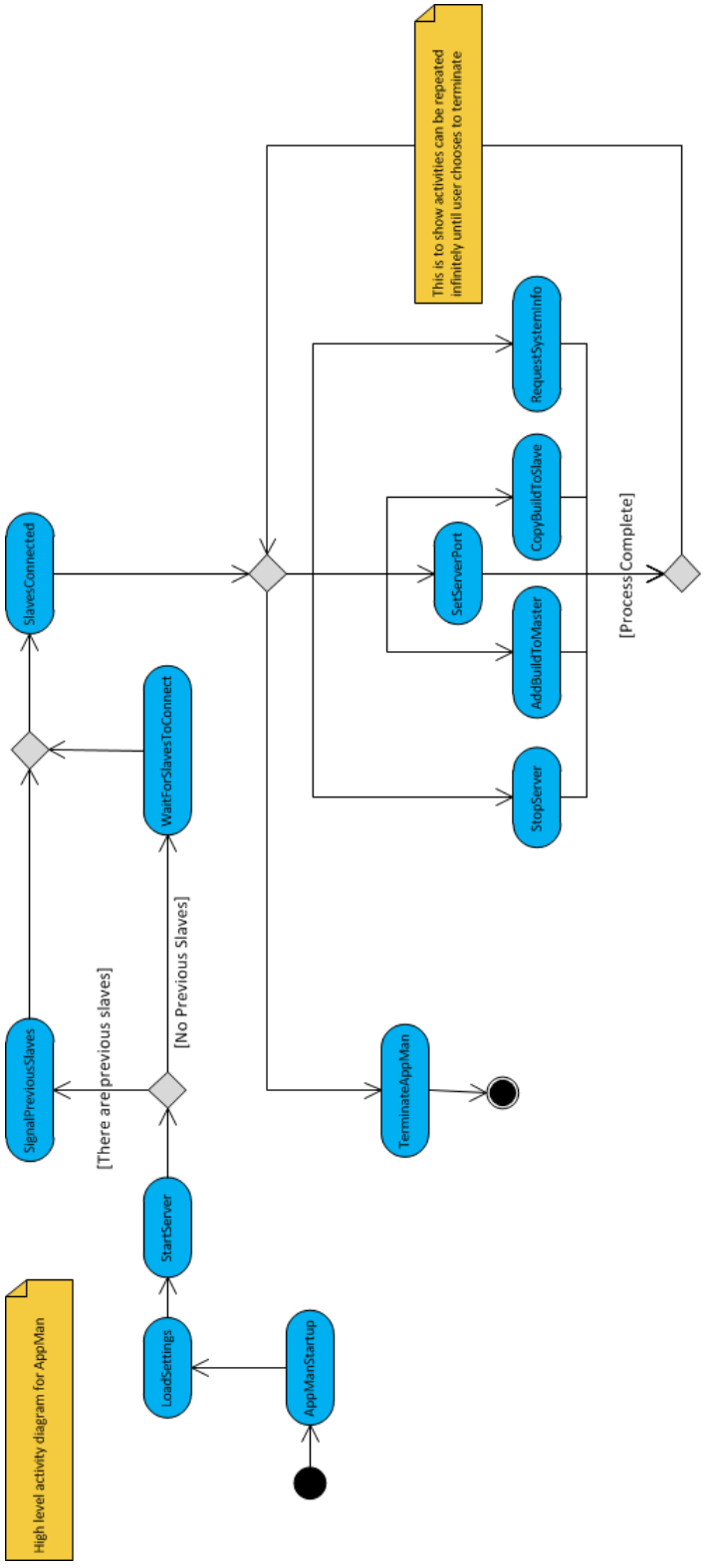

ProtoSlaveCurrentBuilds
-buildIterator: int
<<create>>-ProtoSlaveCurrentBuilds(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-Rechecker(management: Management, masterSocket: QTcpSocket): void
ProtocolHandler
-masterSocket: QTcpSocket
<<CppMacro>>-()
<<create>>-ProtocolHandler(man: Management, parent: QObject)
+handle(data: QString): void
+disconnectFromMaster(): void
+connectToServer(IpAddress: QString, serverPort: int): void
+setSocket(newSocket: QTcpSocket): void
-requestHandler(data: QString): void
-protocolHandler
-protocolHandler
SocketClient
-socket: QTcpSocket
<<CppMacro>>-()
<<create>>-SocketClient(protoHandler: ProtocolHandler, newSocket: QTcpSocket, parent: QObject)
<<destroy>>-SocketClient()
+disconnected(): void
+readyRead(): void
Network
-serverPort: int
-IpAddress: QString
<<create>>-Network(man: Management)
+connecToServer(): void
+setConnectionDetails(ip: QString, port: int): void
+disconnect(): void
-sendBuild
-connect
-getSysInfo
-copyOver
-sizeCheckBuilds
-slaveCurrentBuilds
Protocol
<<CppMacro>>-()
<<create>>-Protocol(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
#startJSONMessage(): QString
#appendJSONValue(currentString: QString, newKey: QString, newValue: QString, addComma: bool): void
#endJSONMessage(currentString: QString): void
ProtoSizeCheckBuilds
-buildIterator: int
<<create>>-ProtoSizeCheckBuilds(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
+sendCurrentBuildMD5(management: Management, masterSocket: QTcpSocket): void
+SizeCheckABuild(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
ProtoCopyOver
<<create>>-ProtoCopyOver(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-CopyBuildOver(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
ProtoGetSysInfo
<<create>>-ProtoGetSysInfo(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-GetDetSysInfo(management: Management, masterSocket: QTcpSocket): void
-GetMinSysInfo(management: Management, masterSocket: QTcpSocket): void
ProtoConnect
-machineID: int
<<create>>-ProtoConnect(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
+disconnectFromMaster(management: Management, socket: QTcpSocket): void
+connectToMaster(ipAddress: QString, serverPort: int, protocolHandler: ProtocolHandler): void
-initiateSlaveCurrentBuilds(masterSocket: QTcpSocket): void
-getThisIDBySettings(): QString
-SetMachineID(newMachineID: int): void
ProtoSendBuild
<<create>>-ProtoSendBuild(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-SendBuildCopyServer(jsonObject: QVariantMap, masterSocket: QTcpSocket): void


ProtoCopyOver
<<create>>-ProtoCopyOver(parent: QObject)
+handle(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
-CopyBuildOver(jsonObject: QVariantMap, management: Management, masterSocket: QTcpSocket): void
CopySenderClient
-allBuildsDirectory: QString
-firstTalk: bool
-port: int
-socket: QTcpSocket
-differentBuilds: QStringList
-hostAddress: QHostAddress
<<CppMacro>>-()
<<create>>-CopySenderClient(hAdr: QHostAddress, portNumber: int, parent: QObject)
<<destroy>>-CopySenderClient()
+connectToHost(): bool
+disconnectedFunction(): void
+readyReadFunction(): void
-startJSONMessage(): QString
-appendJSONValue(currentString: QString, newKey: QString, newValue: QString, addComma: bool): void
-endJSONMessage(currentString: QString): void
-getMachineID(): QString
-handle(data: QString): void
-requestHandler(data: QString): void
-BuildDifferent(jsonObject: QVariantMap): void
-EndAllDifferences(): void
-getBuildMD5Class(directory: QString): BuildMD5
-SendBuildMD5Class(md5Class: BuildMD5, i: int): void
-DeleteFilesList(jsonObject: QVariantMap): void
BuildMD5
-buildFiles: QStringList
-buildFilesMD5: QStringList
-currentIndex: int
<<CppMacro>>-()
<<create>>-BuildMD5(parent: QObject)
<<destroy>>-BuildMD5()
+generateAllMD5(directory: QString): void
+getBuildFiles(): QStringList
+getBuildFilesMD5(): QStringList
+getCurrentBuildDirectory(): QString
+getCurrentFileMd5Sum(): QString
+next(): void
+getCurrentIndex(): int
+getSize(): int

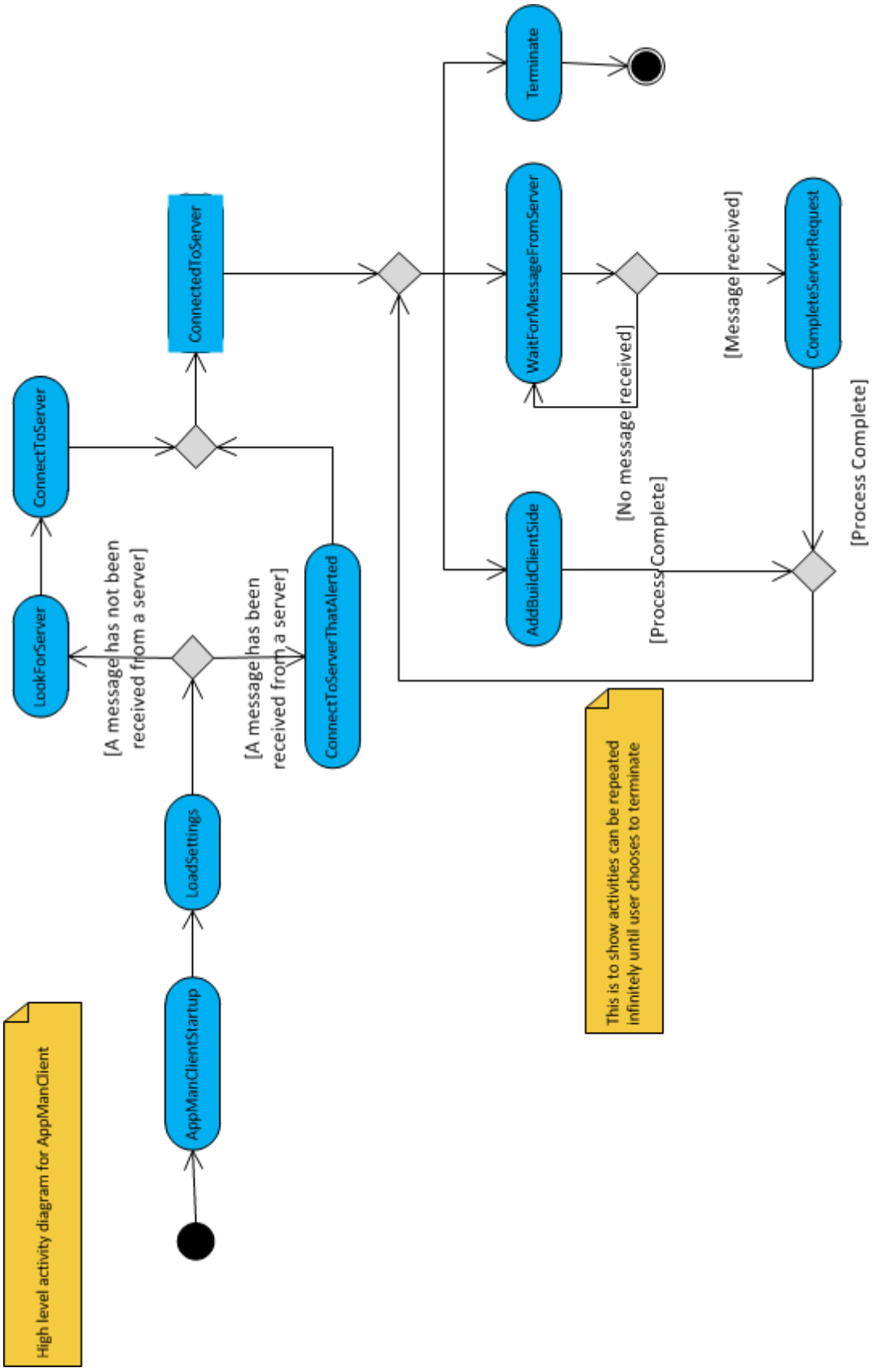
4 Overall Processes

This section is for the Activity diagrams based on current progress of AppMan and AppManClient respectively.

4.1 AppMan



4.2 AppManClient



5 Communication Protocol

5.1 Overview

The communication between AppMan and AppManClient takes place by using JSON objects. The JSON objects are structured such that the content of the JSON message govern where the message will be handled. The communication protocol inside the application is set in a strategy design pattern whereby the context is passed on from the protocol handler to the class that will handle the data. This strategy design pattern is mirrored on the master and the slave machine to link each strategy to its partner on the other application(i.e. master to slave). The concrete strategies are the classes that handle all the data as JSON objects.

The JSON for normal communication is in the following format:

```
{
"handler" : "[  The Handler ] ",
"subHandler" : "[ The SubHandler  ]"
"data" :  "[ Field values ]"
}
```

The ProtocolHandler will firstly look at the handler and based on that it will decide to which concrete strategy it should be passed on. The handler will be a string that contains the name of the concrete strategy to handle the request. After the handler has been identified the data and all other applicable data are passed on to the concrete strategy.

After it has arrived at one of the concrete strategies, the function will look at what the subHandler is. Based on the value of the subHandler, it calls the function labeled to that subhandler by passing the data on to that subHandler.

The data in the JSON object can be a variety of variables ranging from build number to machine ID. This is set in the JSON object and is retrieved by the handler depending on when they need to use it.

5.2 Strategies

The strategy design pattern is easy to adapt and add new classes in order to include new strategies for other communications to take place. This project(AppMan and AppManClient) makes use of the Strategy design pattern in order to communicate. The current concrete strategies are:

- ProtoConnect
- ProtoSlaveCurrentBuilds
- ProtoSizeCheckBuilds
- ProtoCopyOver

- ProtoSendBuild
- ProtoSendStructure
- ProtoDeleteBuild
- ProtoRunSim
- ProtoAppList
- ProtoUpdateUpdateBuildInfo
- ProtoUpdateMachineInfo

ProtoConnect: This strategy will be used in the event that a new client tries to connect. If the correct protocol is not followed in the event of a connection, the socket will be disconnected. If the client successfully connects the strategy will create a new machine and allow the user to interact with that machine. After a machine connected this protocol will invoke the ProtoSlaveCurrentBuilds which will update what builds are currently on the slave machine.

ProtoSlaveCurrentBuilds: This strategy will be invoked each time the slave machine acknowledges a new build that they now have. This can be invoked by the ProtoConnect or ProtoCopyOver. In the event of the ProtoConnect all the builds that are on the slave machine are communicated to the master machine. In the event of ProtoCopyOver, only the new build that has been copied over is communicated.

ProtoSizeCheckBuilds: This strategy is used to find the md5 sum values of the whole directory in which the builds are located. The md5 sum values are calculated for the whole build directory whereby it checks whether the md5 sum values of the master and slave for the same build are the same. It then updates the interface to show whether the build is the right size. This strategy can be invoked by the ProtoCurrentBuilds right after the current builds has been updated on the master machine, in which case each and every build md5 is generated. In the case of ProtoCopyOver invoking this strategy, only the new build that is to be copied over will have the md5 generated for it.

ProtoCopyOver: This strategy is used to communicate a new bulid that should be copied over from the master to the slave machine. The strategy will update on the master only when the slave machine has confirmed the presence of a new build that should be on it.

ProtoSendStructure: The strategy that sends the build directory structure in order to have it duplicated on the slave machine side. This will duplicate the structure in order to keep the file structure similar. The directory structure of the builds are duplicated in order to completely resynchronise the build.

ProtoSendBuild: This strategy will be used after the size check strategy(ProtoSizeCheckBuilds) has confirmed a difference between master and slave builds. Then after that the ProtoSendBuild strategy creates a new server to which the client connects and communicates the differences to send the physical files of the build across the network.

ProtoDeleteBuild: This strategy will communicate when the slave machine needs to

delete a build. This slave will have to delete a build on 3 different occasions(the build is deleted on the master, the build is deleted on slave or when connecting the build does not exist anymore).

ProtoRunSim: This strategy will be used to run simulations on the slave machine by running applications with the command that the application uses to run. Configuration can be set through the use of the run simulation.

ProtoAppList: This is a strategy where the slave machine will add an application name to a list and communicate this to the master. This strategy can then be used to run an application from the master machine.

ProtoUpdateUpdateBuildInfo: This strategy is used to update build specefic information for example the build name.

ProtoUpdateMachineInfo: The machine info will be updated by this strategy such as the machine ID.

6 Database

AppMan uses a SQLite database to store slave related information. The database currently has two tables:

```
CREATE TABLE Machine (
machineId int PRIMARY KEY,
IPaddr text
)

CREATE TABLE Vitality (
machineId int PRIMARY KEY,
CPUusage int,
RAMused int,
RAMavail int,
FOREIGN KEY(machineId) REFERENCES Machine(machineId)
)
```

The database is designed using the singleton design pattern, which means that on creation it will create a single pointer to the database object that will be used consistently throughout the application.

On creation the database will also create the database file [AppMan.db3] and along with the tables; providing the file does not already exist.

The main purpose of the database is to store each slave, with their machineId and last known IP address, which allows AppMan to remember slaves that have previously connected to the master.

Desired future features include:

- Logging system information of each Slave.
- Specialized queries to retrieve needed information.

7 File watcher

A file watcher has been implemented for a build, which is used to monitor the builds. If changes occur to the build, a timer will count down from the change and continually resetting to 25 seconds untill no more changes has been made. Once the timer is done counting down the build will be resynchronised on all the slave machines who is in the posession of the build.

8 Glossary

- Build - An application build version that could potentially be distributed to slave computers.
- Slave - A computer that will be controlled via a master computer. Application builds will be sent to this computer.
- Master - A computer that will control Slaves across a network.
- Server - A machine waiting on the network for connections from other machines.
- GUI - Graphical User Interface with which a user can control the project.
- Project - This project. The distributed application manager.
- Application - A 3rd party program the client may use during simulations