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AUTOMATIC RAILWAY GATE CONTORL SYSTEM

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Abstract- Railways being the cheapest mode of transportation are preferred over all the other mean. When we go through the daily newspapers, we come across many railway accidents occurring at railway crossings. This is mainly due to the carelessness in manual operations or lack of workers. We, in this project has come up with a solution for the same. Using simple electronic components, we have tried to automate the control of railway gates. The aim of this project is to Automate unmanned railway gate using VLSI Technology. When train arrives at the sensing point, alarm is triggered at the railway crossing point so that the people get intimation that gate is going to be closed. Then the control system activates and closes the gate on either side of the track. Once the train crosses the other end, control system automatically lifts the gate. The logic is produced by the program written in VERILOG language. The software program is executed, by using the ISE environment.

Present project is designed to avoid railway accidents happening at unattended railway gates, if implemented in spirit. This project utilizes two alarms on both sides of the tracks. One is fixed at upside (from where the train comes) at a level higher than a human being in exact alignment and similarly the other is fixed at down side of the train direction. Alarm activation time is so adjusted by calculating the time taken at a certain speed to cross at least one compartment of standard minimum size of the Indian railway.

Index Terms- Control System, Radio Frequency ID (RFID),Railway gate, Very Large Scale Integration (VLSI)

INTRODUCTION

There are many railway crossings which are unmanned due to lack of manpower, needed to fulfill the demands. Hence, many accidents occur at such crossings, since there is no one to take care of the functioning of the railway gate when a train approaches the crossing.The objective of this project isto manage the controlsystem of railway gate. The proposed model has been designed to avoid railway accidents occurring at unattended railway gates, if implemented detection of train approaching the gate can be sensed by means ofsensor placed on the gate.

Now a days, India isthe country which having world's largest railway network. Over hundreds of railwaysrunning on track every day. As we know that it is surely impossible to stop, the running train at instant is some critical situation or emergency arises. Train accidents

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having serious repercussion in terms of loss of human life, injury, damage to Railway property. These consequential train accidents - include Collision, Derailments, Fire in Trains, and Collisions of trains at Level Crossings.

Our country is a progressive country. It has already enough economical problems, which are ever been unsolved. To avoid all these things some sort of automatic and independent system comes in picture. So, keeping all these things, aspects, and need of such system our paper tries to make such type of system with the help of various electrical, electronic and mechanical components.

I. EXISTING WORK OR LITERATURE SURVEY

1.1 Train Accident A classification of accidents by their effects (consequences); e.g., head-on collisions, rear-end collisions, derailments. Head on collision; one type of train accident is when two trains collide front face with each other or train colliding on the same track from opposite ends called head on collision. Rear end collision; the other kind is when a train collides into the other that is in front of it, called a rear end collision. Derailments plain track; a train may derail on a simply straight track that may cause the train accident. Curves; derailment of a train is more common when there is a curve on the track causing an accident. Junctions; a train may also get derailed on a junction, which is the place where two tracks converge into one, or one diverges into two.

1.2 Present Indian Railway Technology The ministry of railways has taken steps to reduce the consequential train collision accidents and level crossing accidents. Ministry of railways has invested several crore rupees for modernization and uplift nets of the technologies used in Indian Railways. Presently Indian Railway provides some sign and signal to prevent the train accident.

1.2.1 Warning Signs and Devices used in Indian Railway to Reduced the Level Crossing

1.2.2Advance Warning Sign Sign tells you to slow down, look and listen for the train, and be prepared to stop at the tracks if a train is coming.

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Figure1.2 Advance Warning Sign

1.2.3 Cross-bucks Sign Cross bucks are located at all grade crossings on both approaches to the crossing. Form an X via the intersection of two 1200 mm x 200 mm retro-reflective pieces. A cross buck sign provides the last indication to the driver where the crossing is located.

Figure 1.3 Cross-bunks Sign

1.2.4 Multiple Track Signages Multiple track signages are required when there is more than one track present and are attached below the cross buck sign. A multiple track sign under the cross buck tells the driver the numb more than a single track.

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Figure 1. 4 Multiple Track Signages

1.2.5 Indicator The 'W' is a general whistle indicator while the 'W/L' stands for whistle for level crossing. 'see/pha' = 'seetee bajao - phatak').

Figure1.5 Whistle Indicator

1.3 Level Crossing IndicatorA square yellow board indicates approach to a level crossing

Figure 1.6 Level Crossing Indicator

1.4 Stop Sign and Line Minimum standard stop sign dimensions are 600 mm x 600 mm and sign shape is octagonal. A stop painted across your lane of the road shows you where to stop and look for an approaching train. On a gravel road with no marking, stop at least 15 feet from the railroad tracks.

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Figure 1.7 Stop Sign Line

1.5 Roadway Pavement marking Pavement markings are painted on the roadway just past the AWS and before a highway-railway crossing. The pavements markings consist of a large "X" with a stroke width of 300 to 500 mm. dimensions of the "X" are 6.0 m long and 2.5 m wide. Retro-reflective paint must be used and the "X" must be incorporated on each side of the road before the railway grade crossing.

Figure 1. 8. Roadway Preventive Mark

1.5.1 Manually Activated Signal Manually Activated Signals are operated by level crossing staff, on instructions transmitted by telephone or telegraph signal from the nearest station. Automatic Warning Signals need short track circuits or markers which detect trains and activate warning indications at level crossings. These warning indications are usually flashing lights, or sounds emitted by bells or claxons (horns), or a combination of these two.

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1.5.2 Mechanical Crossing Barriers Mechanical crossing barriers are operated by level crossing staff using hand or electrically powered levers, winches or windlasses. In addition, mechanical barriers providing complete protection of level crossings are connected to manually operate warning signals (Light and Sound).

1.6 Technology Used to Reduce the Train Accident by Indian railway

1.6.1 Walkie – Talkie Set of Crew 5 Wwalkie-talkie sets have been provided to drivers and guards of all the trains for communication in static mode or at low speeds. 25W VHF sets have also been provided at stations on broad gauge double line / multiple line sections so that train crew can communicate with the nearest station masters in the case of emergencies. This is duplex communication wherein both the parties can talk simultaneously. The works for provision of MTRC have been sanctioned on 2,415 km. It will be GSM based MTRC system with digital technology, as being used by cellular networks worldwide.

1.6.2 Auxiliary Warning System Automatic train protection and warning system provides audiovisual warning to the driver and prevents him from passing signals at danger. Presently, an AWS is working on Mumbai suburban area of western and central railways. AWS on 128 kms stretch of southern railway is in progress.

1.6.3 Tail Lamp Guards have been provided the conventional kerosene lit tail lamps. Guards have been provided with electronic flashing tail lamps, having better visibility than the conventional kerosene lit tail lamps. LED type flashing tail lamps have been provided in rear of all trains for better visibility to prevent rear end collision.

1.6.4 Railway Signal Hand signals flags, lamps, bells, and whistles, all right signal, guard's signals, all-ready signal. Hand signals include signals given by hand, or by flags or lamps used by the signalman, drivers, guards, or station staff. The all-right signal refers to the display of green flags by stationmasters (or other staff), line side workers; level crossing gatekeepers, and others, to passing trains. The green flag is held in the left hand. The red flag is kept ready to be displayed in case of a problem in the right hand. A steady green signal shown by the guard is an indication that there is no problem (or no longer any problem) and that the train can continue on its journey. A green flag or lamp waved violently up and down, however, is the signal that the train has parted, and the driver should bring his portion of the train to a halt. The all-ready signal is given to indicate that the

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everything is ready and in order for the train movement for which it is given. It is given by 3 quick waves a green flag horizontally followed by 2 quick waves vertically; at night, waves of a green lamp are used in similar fashion.

1.7 Research Works

1.7.1Flasher Light Flasher lights have been provided on all 7000 locomotives to warn trains coming from opposite direction, after a derailment on double line, and prevent such type of collisions. Automatic switching "ON" of the flasher lights, not requiring the interference of drivers and becoming operational in case of sudden need, have also been introduced. Automatic loco flasher lights are being progressively installed on locomotives to give indication to drivers of trains running from opposite direction in case of mishap for prevention of further accidents. Automatic Warning Signals need short track circuits or markers which detect trains and activate warning indications at level crossings. These warningindications are usually flashing lights, or sounds emitted by bells or claxons (horns), or a combination of these two.

1.7.2 Automatic train detector An automatic device to detect the presence and speed of a train in block sections at the approach to a level crossing. They are installed only near unmanned level crossings and usually consist of a series of transponders inserted in track at certain intervals and interlocked with level crossing barriers and warning signals. Such devices must be capable of detecting train speeds since the elapsed time between a train's detection and its arrival at a crossing will be a function of its speed. The alternative to installation of automatic train detectors is to have train starting signals at stations interlocked with level crossing barriers and warning signals. These signals have the capability of identifying the type and hence speed of different trains and will transmit the appropriate signal to the level crossing protection system in order to activate it at a specified time before the arrival of a train. In the case of manned level crossing the function of the train detector is substituted by level crossing staff, which receives advance warning by telephone or telegraph from the nearest station of the arrival of a train.

1.7.3 Load Cell Each zone containing load cell as a pressure sensor, the load cell used is compression type load cell. The threshold of load cell is set to six tones. Whenever a train or any object passes over the load cell, the load cell crosses its threshold and it gives analog signal to the load cell processing unit. The load cell processing unit consists of buffer IC74 LS 245, A/D Converter which convert analog signal which are coming from load cell into digital signal. Now these digitized

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signals are sent to RS 485 communication protocol. Here the RS 485 communication protocol provides the communication interfacing with 8051 microcontroller.8051microcontroller communicates with RS 485 and fetches the original status (0 or 1) of each load cell. The main function of 8051 based logic signal processing unit is to identify the error from the received data

1.7.4 Problem Identification The status of the present Indian Railway is as follows:

1. Presently railway-crossing gates are operated manually. At present scenario, in level crossings, a gatekeeper operates the railway gate normally after receiving the information about the train's arrival. When a train starts to leave a station, stationmaster of the particular station delivers the information to the nearby gate. The above said procedures are followed for operating the railway gates. Problems Faced:

- Sometimes the road traffic is so busy that it becomes impossible for the gatekeeper to shut down the gates in correct time

• In many remote areas, railway-crossing gates are open and no person is located for the operation of gates and hence leading to accidents.

• Many times gates are shut down too early leading to wastage of time of people stuck at crossing.

2. Presently as such no centralized system is there through which we can track the location of trains from any center point. Problems Faced:

• As trains cannot be centrally located, often more than one train runs on the same track in opposite direction leading to accidents

Presently in Indian Railway only semiautomatic railway gate operation is followed in certain areas.

4.Signals are located in the vicinity of the railway gate along with gate master board and a marker light.

5. If barriers remain closed for excessive periods on crossings carrying a high volume of road and rail

6. traffic, the build-up of road traffic will exceed the capacity of the crossing to safely discharge this build-up before the next train arrival at the crossing.

7. A number of train accidents happened due to a manual system of signals between stations.

8. Presently signals are control by mean of interlocking system and for this system require regular maintenance and upgrading.

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II. PROPOSED WORK

The main aim of this project isto Automate unmanned railway gate using VLSI technology. When train arrives at the sensing point, alarm is triggered at the railway crossing point so that the people get intimation that gate is going to be closed. Then the control system activates and close the gate on either side of the track. Once the train crosses the other end, control system automatically lifts the gate. The logic produced by the program written in VERILOG language. The software program is executed, by using the ISE environment. The status of the present Indian railway is as follows;

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• When a train starts to leave a station, station master of the particular station delivers the information to the nearby gate. The above said procedures are followed for operating the railway gate.

• Presently as such no centralized system is there through which we can track the location of trains from any center point.

• Sometimes the road traffic is so busy that it becomes impossible for the gatekeeper to shutdown the gates in correct time

• In many remote areas, railway-crossing gates are open and no person is located for the operation of gates and hence leading to accidents.

• Many times gates are shutdown too early leading to wastage of time of people stuck at crossing.

• As trains cannot be centrally located, often more than one train runs on the same track in opposite direction leading to accidents.

• The proposed model has been designed to avoid railway accidents occurring at unattended railway gates.

• If implemented detection of train approaching the gate can be sensed by means of sensor placed on the gate.

A timer is a specialized type of clock which is used to measure time intervals. A timer that counts from zero upwards for measuring time elapsed is often called a stopwatch. It is a device that counts down from a specified time interval and used to generate a time delay, for example, an hourglass is a timer.

A counter is a device that stores (and sometimes displays) the number of times a particular event or process occurred, with respect to a clock signal. It is used to count the events happening outside the microcontroller. In electronics, counters can be

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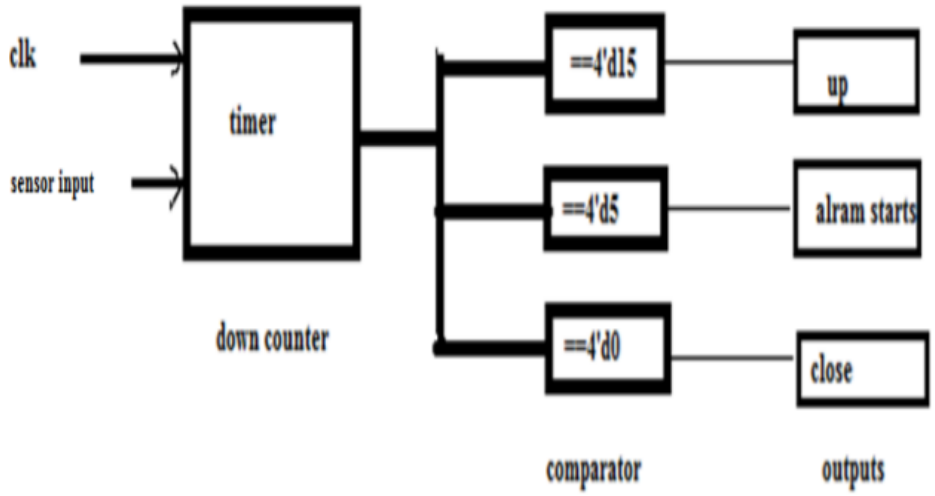
implemented quite easily using register-type circuits such as a flip-flop It is a group of flip-flops with a clock signal applied. Counters are of two types.

Asynchronous or ripple counters. Synchronous counters. Classification of counters Depending on the way in which the counting progresses, the synchronous or asynchronous counters areclassified as follows − Up counters Down counters Up/Down counters UP/DOWN Counter Up counter and down counter is combined together to obtain an UP/DOWN counter. A mode control (M) input is also provided to select either up or down mode. A combinational circuit is required to be designed and used between each pair of flip-flop in order to achieve the up/down operation

BLOCK DIAGRAM



WORKING

• Initially the gate will be in open state and the counter is set high[4'd15].

• By sensor input the counter starts decrementing according to the providing clock.

• If the counter reaches at count 4'd5 then alarm is buzzed.

• If the counter reaches at count 4'd0 then the gate will be closed.

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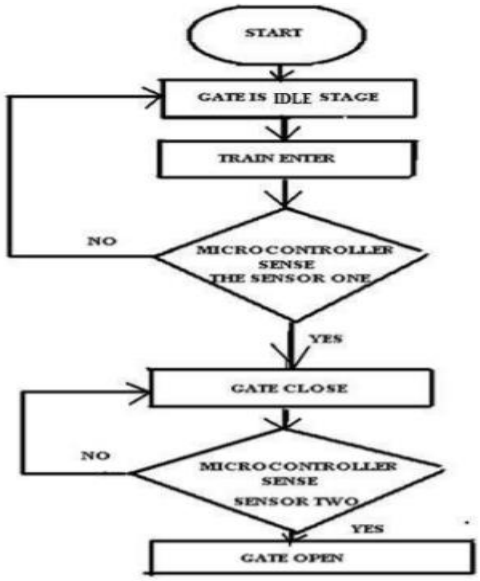
FLOWCHAT



ALGORITHM

1. Start.

2. Set the variables.

3. Make initial settings of the signals for the train.

4. Check the arrival ofthe train in either direction by sensors. If train is sensed go to STEP5.Otherwise repeat STEP 4.

5. Close the gate.

6. Change the signal for train.

7. Check the train departure by the sensor, if the train sensed goes to STEP 8,otherwise go to STEP 5.the train sensed to STEP otherwise go to STEP 5.

8. Open the gate.

9. Go to STEP 3.

10. STOP.

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III. RESULTS AND DISCUSSION(IF ANY)

1 MODULE DIAGRAM

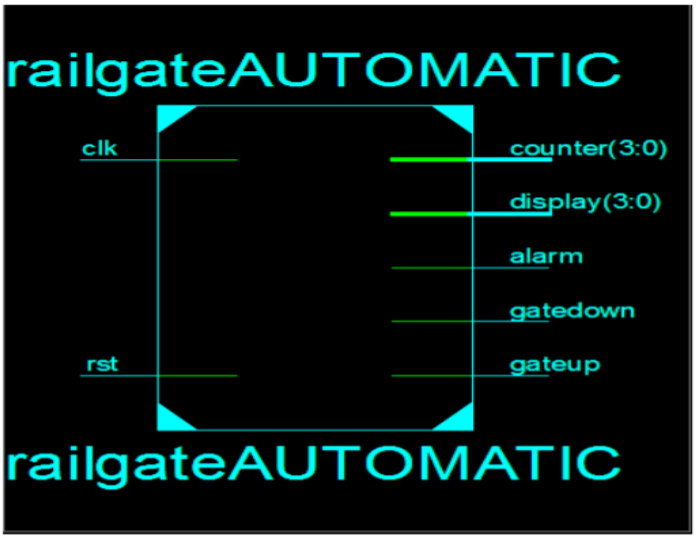
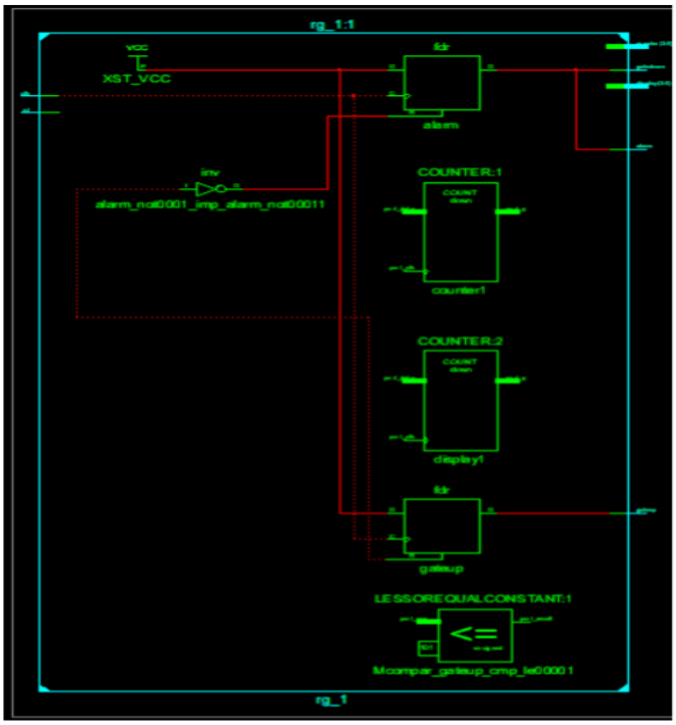


Fig:- 1 Modular diagram of Automatic railway gate system

RTL SCHEMATIC



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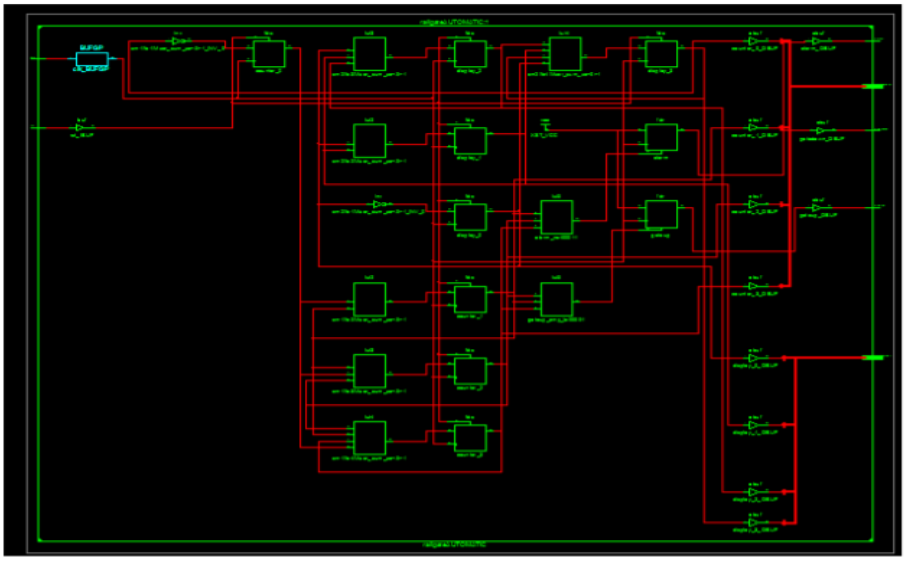
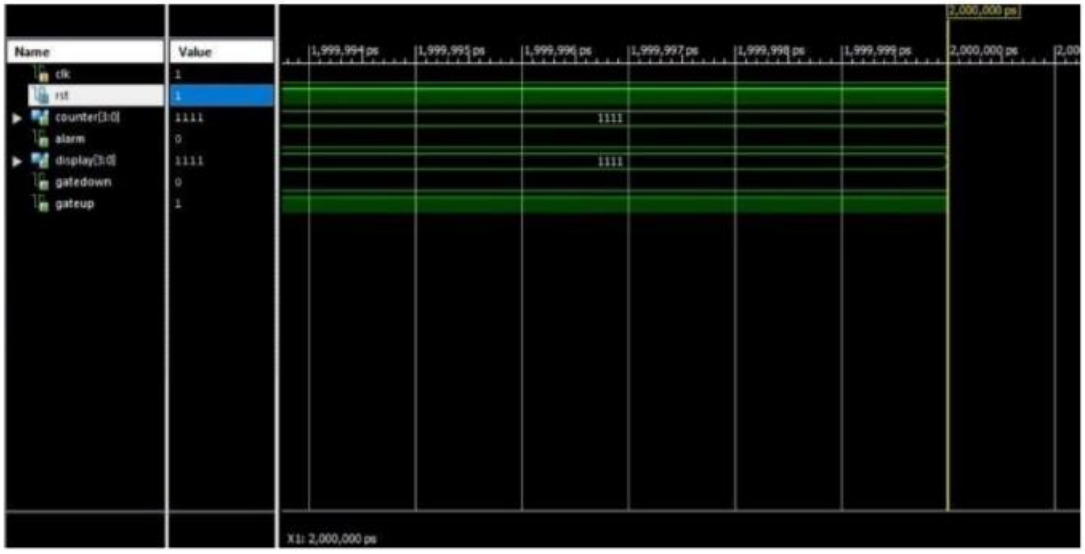
TECHNOLOGY SCHEMATIC



SIMULATION



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IV. CONCLUSION

The unmanned railway gate controller basic model is analyzed and implemented, synthesized and simulated in Xilinx-Ise tool. The implementation of automatic gate system will advance a lot in today's life and provides less risks of getting accidents. The analyzed design is implemented using the Verilog HDL language. By providing the best proximity sensors are placed and according to that the operation of closing door and opening door will get related so that the whole automatic railway gate controller can be implemented effectively.

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