IIT KANPUR

CS731A

PROJECT PROPOSAL

Appraisal System (ACR) on Blockchain

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1 Motivation and Introduction

Appraisal System/ACR (Annual Confidential Reports) of any organization (government/private) is an important framework/procedure to gauge the performance of employees in the areas of their work, conduct, character and capabilities. Presently all over the world the 'Appraisal System' in different forms is being used for assessing the performance/advancement of employees and also to serve the data for judging their comparative merits for confirmation, promotion, selection grade, crossing efficiency bar, continuance in service beyond certain age. Therefore, it is one of the important administrative data which needs to be preserved in original form starting from joining the organization till retirement of the employees.

Apropos, it is of paramount importance to have fair and transparent Appraisal System framework where there should not be any ambiguity and employees must have full trust on the system. Presently, in India most of the government organizations follow the manual paper signed based Appraisal System where a chance of manipulation/omission/destruction is very high. Similarly, many private and very few government organizations in India have switched to centralized three tier based automation appraisal system which again lacks trust, privacy, and security which results in very high numbers of litigation in the courts/tribunal. Screenshot of Automated Appraisal System of Himachal Pradesh Government is attached as Appendix to this report as an Reference. In general, the entities/parties involved in ACR system in any organizations are similar, we in our project going to implement the ACR system of ARMED FORCES where it plays a pivotal role given the pyramidal nature of rank structure.

2 Why Blockchain-Based solution for Apprisal Systems

The need for blockchain-based solution for apprisal systems arises with the various problems associated with the current practices of the Appraisal System in the various organizations necessitating to switch to Blockchain based solution.

- All entities such as Ratee, IO, RO and SRO have different roles and views on the CR System, therefore, if a ratee has any contacts or Reviewing Officer wants to favour any particular Ratee, he can return the ACR originally written by IO informally and make him reinitialize the ACR.
- Rattee ,IO ,RO and SRO has to write CR in stipulated time frame as per rules and regulations, which due to manual nature highly being forged/manipulated.
- The CR System has important bearing not only on promotion but also on postings, appointments , foreign assignments etc, therefore many times to favour particular employees the receipt/transaction of CR system in hierarchy are manipulated.
- At many times ,due to political/hierarchical pressure to favour or restrict promotion to particular officer, The CR of particular year are manipulated/forged at Record Office.
- Many times the Medical data/other essential data are incorrectly filled in CR. These official
 factual details needs to be put on blockchain based on its occurrence to avoid manipulations.

- Many incidents have come to light where to avoid endorsement by particular IO/RO/SRO,
 Leave details of employees are manipulated as it is necessary to perform minimum number of days of duties under particular IO/RO/SRO.
- Many times details of CR are leaked from Record Office which is highly confidential and can be misused by peers.

3 Features

There are total seven entities involved in a typical ACR process (We are implementing the system similar to the one in Defense Services) of an employee in an organization. Here we will provide the appropriate privileges to each entity based on the roles assigned to them. The role of each entity and features to be designed for them are listed below:

- 1. Ratee: Ratee is the person whose appraisal has to be written and s/he initiates/fills essentials columns for his/her endorsement. He approves his appraisal again after approval by IO.
 - submit_appraisal_application(): This sends the application to peer(IO) for approval.
 - get_approved_application(): Once IO approves and gives remarks on the application this function is used to get the approved application)
 - super_approve(): After getting the application from the IO the ratee super approves the application again to send it to the RO.
- 2. **Initiating Officer(IO):** First Officer who approves the appraisals. He reviews the appraisal of a Ratee and after the endorsement, he will send the appraisal back to the Ratee for his/her endorsement. **Functions:**
 - fetch_available_appraisal_applications(): Gets all the applications that are sent by ratees for approval.
 - fetch_all_ratees(): Lists all the ratees that are under the IO.
 - approve_appraisal_application(Ratee id): Approves the appraisal application of a ratee(ratee_ID) with a remark given by the IO.
- 3. Reviewing Officer(RO): Second Officer in Chain of Command who review and endorsed the appraisal and has power to moderate and eliminate biases Functions:
 - get_appraisals(): Get all the appraisals pending or approval. Shows the corresponding as well who have approved the appraisal before with their remarks.
 - get_ratees(): Get the names of all ratees under him and their appraisal approval status.
 - approve_appraisal(Ratee id): Approve the proposal for a ratee using Ratee id with reamrks.

- 4. **Senior Reviewing Officer(SRO):** Senior Officer who reviews report from IO and RO and have power to moderate and eliminate biases
 - get_appraisals(): Get all the appraisals pending for approval. Shows the corresponding as well who have approved the appraisal before with their remarks.
 - get_ratees(): Get the names of all ratees under him and their appraisal approval status.
 - approve_appraisal(Ratee id): Approve the proposal for a ratee with Ratee id.
- 5. Accepting Officer(AO): Officer empowered to finally accept the ACR of a Ratee with essential remarks. No modification is allowed after the endorsement by the AO and the CR is said to be complete. He can view the status of ACRs of all the Ratees under him/her approve the ones which have already been endorsed by SRO.
 - get_appraisals(): Get all the appraisals pending for approval. Shows the corresponding as well who have approved the appraisal before with their remarks.
 - get_ratees(): Get the names of all ratees under him and their appraisal approval status.
 - approve_appraisal(Ratee id): Approve the proposal for a ratee with Ratee id.
- 6. Admin: His job is to bootstrap the setup of blockchains on defence servers (DS) and Accepting Officer (AO). He is supposed to setup application and client software which creates allows users. (Ratees/AOs/IOs etc) to create and register their identities on hyperledger blockchain.
 - add_employee(): Add the new employee and assign the role.
 - update_role(id, new_role): Update the new role of a officer.
 - update_blockchain(): Modify the blockchain policy as per updation in the organization.
- 7. **Clerk:** The person who maintains assign the records of officers with ranks. Clerk will assign the various ACR tasks to various officers pertaining to their departments and ranks.
 - mark_attendance(Ratee id, bool present): Marks the attendance of ratee id. Only one attendance is allowed in a day.
- 8. Common Functions (Can be invoked by anybody):
 - check_attendance(Ratee id): Allows checking the attendance of any person to maintain transparency.
 - check_status_ACR(Ratee id): Allows the ratee to view the status of his/her ACR i.e. currently where his/her, this will not allow the ratee to view the comments by RO, SRO and AO.

Note that these functions would be implemented in the Chaincode and above description gives a tentative schema of implementation. For each individual approval and remarks, we would have different variables in the Chaincode whose permissions to read/write would be appropriately set by Access Control Lists (ACL). Further access would be restricted for each entity to view/edit appraisals on their command by adding constraints to the peers since only they store the entire ledger.

4 System Architecture

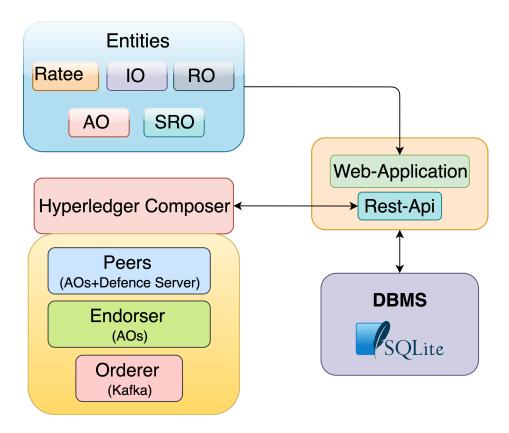


Figure 1: Software Architecture

5 Testing

We would deploy peers, orderers and endorsers on docker containers. All the containers would be networked and accessible to each other. We would specify appropriate IP addresses and ports to route connections as would happen in a real world deployment scenario. All the containers will be then booted up in sequence.

We would also have a webserver based on Django as described in the software Architecture. Identity of the person would be verified by REST Authentication feature of Hyperledger. In a practical scenario, when any user (Ratee, IO etc) logs in, they would see a clean web interface which allows them to enter/approve/remark appraisal. A thorough testing of the flow and hierarchy

would be done by adding dummy appraisals to the system and verifying them with the expected behaviour.

Finally, real deployment would be done on the pan-India network of Defense Sector of India. Accepting Officers are present across different states and peers would be physically located (the servers that is) in their offices. One could also configure a DNS(Domain Name Service) server to return the peer closest to their query location to improve access by various users in our system.

6 Plan of Work

Tentatively we have decide the following steps to implement the apprisal system on the blockchain.

- 1. 5 days: Learning basics about hyperledger fabric and hyperledger composer
- 2. 5 days: Implementation of basic features
- 3. 2 days: Improving the scalability of our product
- 4. 5 days: Testing of features
- 5. 3 days: Adding extra features

7 Limitations and Future Work

Blockchains provide security gaurantees that comes with a cost of scalability, so scalability is one of the issue in our system. However, to tackle the issue, we have included the provision of peers on defense servers. One can increase number of peers to balance the load on servers.

8 Appendix

Uploaded online ACR Step by step

- 1.Open the website www.himachal.nic.in
- 2. Select the :e-Services
- 3. click the: eService Book Personel MIS



Uploaded online ACR Step by step.....

Enter the ID& Password Click the login button..... For any query regarding online ACR please



Instructions to Fill Annual Confidential Report

In this module there are three parts following as

- 1. How an employee Fill his/her Self-Appraisal Report.
- 2. How a Reporting Officer assessment the ACR report.
- 3. How a Reviewing Officer Remarks on the ACR report.

NOTE:-Before Filling the ACR you have to, update your Photo and Signature in Manav Sampada.

When an employee Visits the "Manav Sampada" using his / her credentials (Login Id and Password). Then

Go to My Profile Upload ACR



When a user click on the Upload ACR then a Panel Regarding the Employee Detail Open such as. (Part A- Employee Detail) in which an employee- user can check his detail.

ged As: 10003-	De SHARDA CHAUHAN	DO DE COSE DO	TH AND FAMILY WEI	FARE		n and Famil elfare (DHS
itialization 🕨 E	ServiceBook Master	ALL STREET, ST	saction Reports/Querie	s Transfer/	Promotion 🕨	My Profile
		Part A -	Employee Detail			
Employee Code First Name			Middle Name			
Last Name	CHAUHAN		Date of Birth 02/	11/1969	o	
	Click Here To Enab	le And Get ACR Detail	Instruction For How To Fit	I ACR		

And then click on a button named Click Here to enable and Get ACR Detail

After that three types of Panel are opened such as.

 For filling up the self-apprai For assessment by reportir For remarking by the review 	ng officer on acr Report.			
				1
Employee Code 10003				
First Name SHARDA	Middle Name			
THE Name OFFICE	Middle Name			
Last Name CHAUHAN	Date of Birth 02/11/1969	- o		
Click Here To Enable And G	Tet ACR Detail Instruction For How To Fill ACR			
(Click Here To Fill Your Self	Appraisal) Part B -To be filled by the Office	er Reporte	d Upon	
(Click Here To Add Reporting	Officer Assessment) Part C - Assessment	By Reporti	officer	
(Click Here To Add Reviewing	Officer Assessment) Part D - Remarks Of 1	he Review	ing Officer [√]	

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For Filling up the self-appraisal report

(Click on the Part B-To be filled by officer Reported Upon)

After click on the above Panel Header, Part B will be Opened and enabled and you Can fill yours self-appraisal report.

There are some points which you have to remember when you are filling the acr detail which are as follows.

- 1. Select Acr Financial Year on which year you are going to Fill Acr.
- 2. Select Time Period By selecting the from and to date.
- 3. Click on the Button Get Leave to Fill no of Leave during the above period which you have select .lf you are not satisfy the leave which are calculated

Automatically by click on the button or you take any leave and want to mention in his/ her acr report then you can also fill it accordingly.

- 4. You have to fill all fields giving in this acr module (part b). No one filed You Left blank.
- 5. You can also add row after filling the first row, otherwise it will give a message to add row first.
- 6. You can also delete a row but all rows cannot be deleted .Ex (You filled one row and then add row for filling more data but if you think to delete it so then you can delete it but there will be one row.)
- 7. After filling all the fields now click on save button to save the ACR data.
- 8. Your acr data for the selected time period and financial year is saved and now you have to submit it to the reporting officer for assessment.
- 9. You can also Fill Your another acr for the selected financial year but the time period (date between from and to date will be different means the time period from date for the second acr will be greater from the previous acr to date)

10.	One	more	thing	to	remember	is	that	you	can	also	fill	second	acr	When	the
	Prev	ious A	cr is s	JCC	essfully sub	mit	tted to	o the	Repo	orting	offi	cer.			

----- Screen shots of the above acr module are giving below-----

(6	Click Here To Fill Your Self	Appraisal) Part I	3 -To be filled by th	ne Officer Reported Upon	
Vhich Year Y	ou Are Going To Fill ACR SEL	LECT - AC	R No For Selected Yea	ir.	
ate Between	ns You Are Filling the ACR 16/0	5/2013 A	nd 16/05/2013	GET LEAVE	
O.Of Leaves	During The Above Period				
. A Brief Sun	nmary of duties and responsibil	lities(Not more than	50 words):		
					1
Please Spe rget/object	cify important Items Of work in ives/goals were set for you or	n order of priority w set by yourself for	here in quantitative / the reporting year:	physical /financial	
		Physical or Fin	ancial targets/	N. N. C.	1
Sr.No.	Item Work	objective	s / goals	Achievements	
	*		*		
1					Deista
		Add F	low		
. Please Spo	ecify number of inspections con	nducted / tours perf	ormed (only in case o	f field officer):	
Sr.No.	No. Of inspections / tours of performed in a y	expected to be year	No of inspections / reason	tours actually performed with of short fall , if any	١.
		*			
4					Delate
		Add F) 		
		Addi	tow		
		Sa	ve		
(CII	ck Here To Add Reporting	Officer Assessm	ent) Part C - Asses	sment By Reporting Offic	er
	k Here To Add Paylewing	Officer Assessme	nt) Part D - Remar	ks Of The Reviewing Offi	cer

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11. Unen act cata is saled for the selected financial year then a grid regarding. The act detail is shown as below.



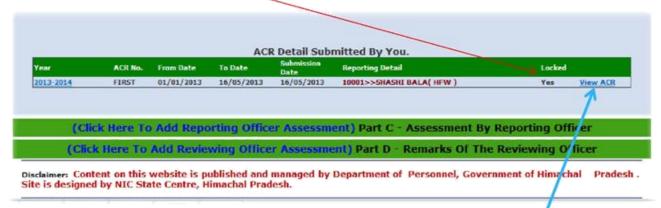
12. Click on the above link and after that all the fields filled with data and then You can either update the acr data (if changed) or submitted it to the Reporting officer for assessment.



- 13. You can Update the Acr Detail by click on the Update Button and submit it To the Reporting Officer for assessment .Once you submit the acr detail Then you cannot change the acr detail.
- 14. After Click on submit to the reporting Officer Button a panel regarding the Reporting Officer Detail will be opened and you have to fill the Detail to Which Reporting officer you want to send his her acrireport.



15. Click on the submit button to submit the acr detail for reporting officer.
Once the acr detail is submit no one can change it and this acr detail
Will be locked.



16. Now Your Acr Detail is successfully Submitted and now you can check or Download yours Acr detail submitted by you by clicking on the View Acr Link Button.

How a Reporting Officer assessment the Acr report.

- 1. An employee (Reporting officer) Visits the "Manav Sampada" using his/her credentials and login into the "Manav Sampada" and opens the module Upload ACR.
- 2. Click on the button Click Here To Enable And Get ACR Detail



- 3. In case of Reporting Officer when he/she click the button a grid will be appeared which contain the detail whose send to him his /her acr report.
 - Ex-Sharda Chauchan sends her acr detail to Shashi Bala for the Financial Year 2013-2014 for assessment the Acr report.

Department of HEALTH AND FAMILY WELFARE

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Last Name BALA			Date o	of Birth 12/05/19	958		
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Click Her	e To Enable And Get	ACR Detail	Instruction F	or How To Fill AC	CR		
EMP NAME	DEPT NAME	Reporting Li	st of Emplo	ACR FROM DATE	ACR TO DATE	SUBMIT D	DATE
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			- 199 - 199				
4. Now Reporting o			he empl	oyee fill in h	nis / her self	-apprai	sal
report for Assess			:				
5. Click on the Abov	e Emp name	in	grid whi	ch employe	ee acr you w	ant to	
assessment.							
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Part –B but this p			•	see and yo	ou have not		
Any permission to	•						
6. Now you can clic)	acr deta	il filled By th	e empl	oyee
In his/ her self-ap	praisal report						
7. And Bases on the	e part b you ca	an filled th	e part c -	-Assessme	ent by report	ing Offi	cer.

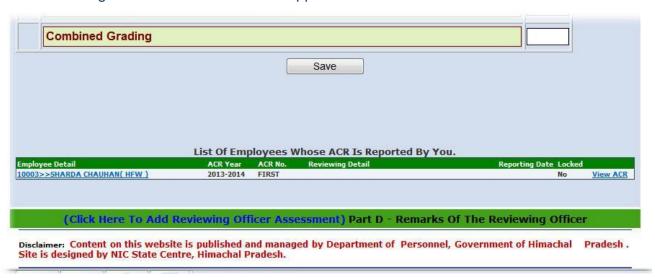
8. Check the employee name whose acr you are going to fill assessment in the Part c.

(Click Here To Add Reporting Officer Assessment) Part C - Assessment By Reporting Officer

	Are Reporting The ACR Report of SHARDA CHAUHAN for the Year 2013-2014 From 01/01/2013 To 05/2013
1.Ti	me Served By the Employee Under The Reporting Officer
the !	to You Agree with resume of work as indicated by the officer in the part 2 of the report in prticular regarding special achievement, if any, mentioned by the officer. If not, indicate briefly the reasons for disagreeing it and the extent of your disagreement.
3.5	State of Health :
sele	ect •
4 . I [inst	ntegrity: tructions contained in Ministry of Home Affairs O.M.No.51/4/64-Estt,(A) , dated 21-6-1995 should be kept in mind].
sele	ect •
5. A	ttitude towards Scheduled Castes and Scheduled Tribes
sele	ect -
6.As	sessment Of Work Output>>>>(Grades Should be assigned on a scale of 1-10)
	Reporting Authority
1>>	
2>>	
3>>	Accomplishment Of Exceptional Work/Unforeseen tasks Performed
	Overall Grading On Work Output
7. A	ssessment Of Personal Attribute>>>>(Grades should be assigned on a scale of 1-5)
	Reporting Authority
	Attitude Of Work
2>>	Sense of Responsibility Overall Bearing and Personality
-	Emotional Stablity
5>>	Communication Skills
6>>	More courage and willingness to take a professional stand
7>>	
	Capacity to work in time limit
	Overall Grading On Personal Attribute
	Overall Grading On Personal Attribute

	Re	eporting Authority
>3	Knowledge of laws/rules/procedure/IT skills and awareness of the local norms in the relevant area.	
>>	Strategic planning ability	
>:	Decision Making Ability	
>:	Initiative	
>>	CO-ordination ability	
>:	Ability to Motivate and develope subordinates/work in a team	
	Overall Grading On Functional Competency	
	Combined Grading	
	Save	

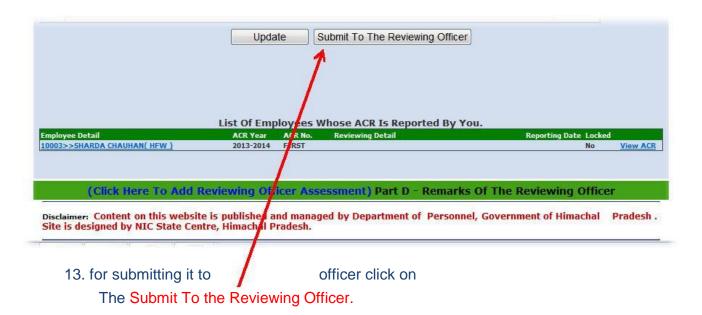
- 9. In the above part from 1 to 5 you have to select and fill the data and further you have to give the number (Grading).
- 10. after filling the all fields with data you have to press the save button to save The data .And a grid contain the data will be appeared such as.



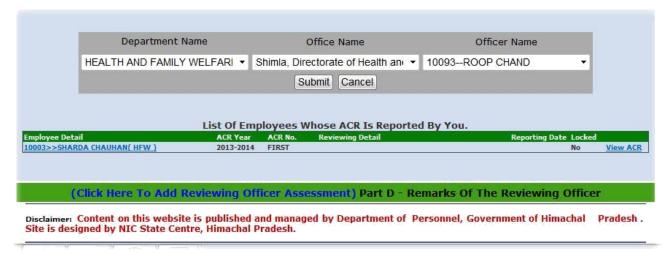
11. This Grid contain all acr record whose acr is assessment by you as a Reporting officer.

		Save	
	CONTROL CONTRO	/hose ACR Is Reported By Y	10 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -
ployee Detail 003>>SHARDA CHAUHAN(HFW)	List Of Employees W ACR Year ACR No. 2013-2014 FIRST	/hose ACR Is Reported By \\ Reviewing Detail	COU. Reporting Date Locked No View A
Contract Con	ACR Year ACR No.	NAME OF TAXABLE PARTY.	Reporting Date Locked

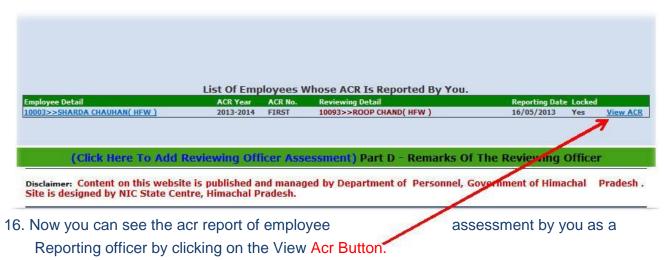
12. Click on the employee name in the grid view and all the fields are filled with data and now you can update the data or submit it to the reviewing officer for Remarking on the acr detail.



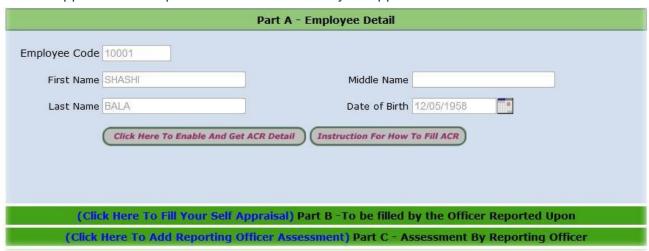
14. After clicking on the above button a panel regarding the Reviewing Detail Will be opened and you have to choose the officer which you want to Submit the acr detail for reviewing.



15. After clicking on the above button a panel regarding the Reviewing Detail Will be Opened and you have to choose the officer which you want to Submit the acr Detail for reviewing. Click on the submit button to submit the acr detail to the Reviewing officer once the detail is submit then it cannot be Changed and this Acr detail will be locked.



17. When the acr is successfully submitted to the reviewing officer then the record Which are appeared in the part a will be automatically disappeared.



How a Reviewing Officer Remarks on the Acr report

1. An employee (Reviewing officer) Visits the "Manav Sampada" using his/her credentials and login into the "Manav Sampada" and opens the module Upload ACR.

2. Click on the button Click Here To Enable And Get ACR Detail

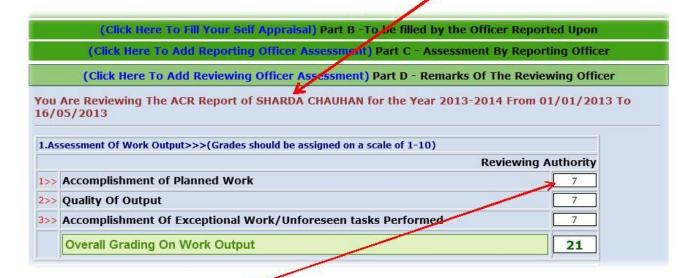


3. In case of Reviewing Officer when he/she click the button a grid will be appeared which contain the detail whose send to him the acr report Remarking. Ex-Shashi Bala Sends the acr report of Sharda han to you for Remarking. Click Here To Enable And Get ACR Detail Instruction For How To Fill ACR Reviewing List of Employee EMP NAME DEPT NAME DATE OF SUBMIT REPORTING DEPT NAME REPORTING EMP NAME HEALTH AND FAMILY WELFARE SHARDA CHAUHAN HEALTH AND FAMILY 16/05/2013 2013-2014 SHASHI BALA WELFARE (Click Here To Fill Your Self Appraisal) Part B -To be filled by the Officer Reported Upon (Click Here To Add Reporting Officer Assessment) Part C - Assessment By Reporting Officer (Click Here To Add Reviewing Officer Assessment) Part D - Remarks Of The Reviewing Officer Disclaimer: Content on this website is published and managed by Department of Personnel, Government of Himachal Pradesh . Site is designed by NIC State Centre, Himachal Pradesh.

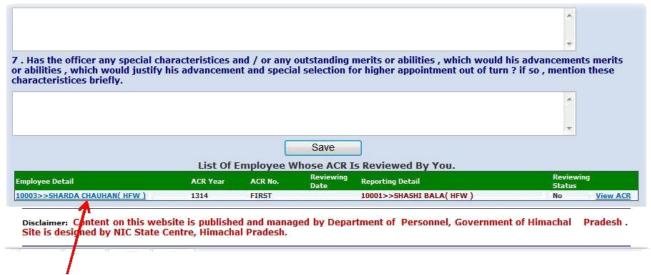
- 4. Click on the EMP name in the grid for remarking on the acr report.
- 5. Now Part B and Part C are filled with data but this parts will be disabled means you can only see that in Part B and Part C . You cannot do further any action in Part I Bnd Part T C



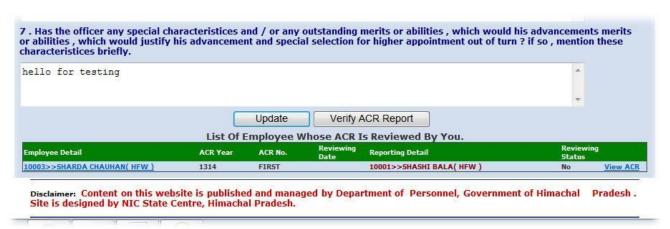
- 6. Part B contain the data which are filled by employee in his / her self-appraisal Report and Part C contain the data which are assessment by reporting Officer.
- 7. Click on Part D to give remarking on the acr report. First check on which acr You are going to give remarking as reviewing officer.



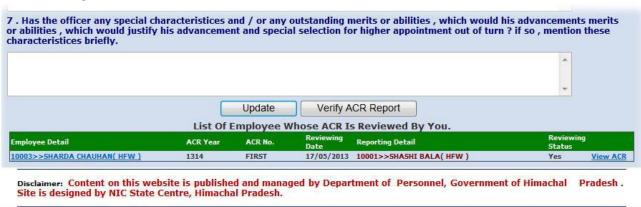
- In Part D all the grading field are filled with grade which are given by reporting officer if you are not satisfy with the grading given by employee then you can Change it accordingly.
- 9. Fill the entire Field and click on the Save Button to Save Data.



10. Click on the Emp Name To update Data or Lock the acr report which are Remarked by you.



- 11. Click on the update button if you did any change in part D otherwise click On Verify ACR Report Button to Lock the Acr report.
- 12. Once You Click on Verify Acr report button then It will be Locked and you can Not Change it.



13. Click on the View Acr Button To view complete Acr of an employee which are Reviewed By you as a Reviewing Officer.

Upload the online ACR step by step...